

SOUTHERN POWER AND INDUSTRY

MARCH, 1957

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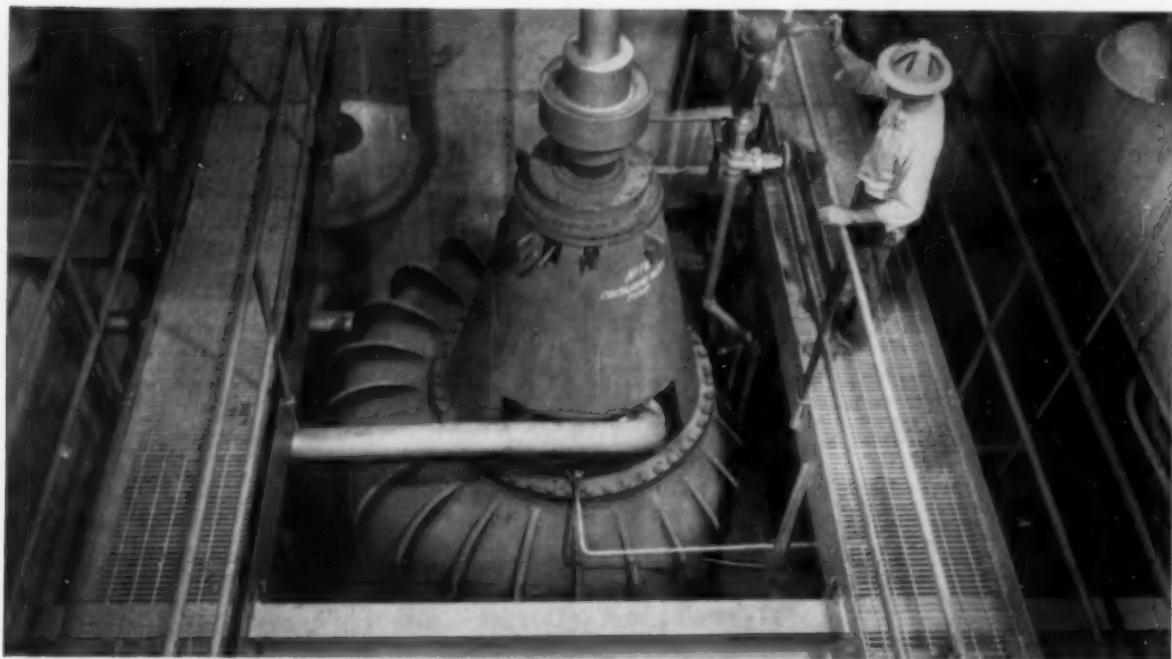
SPI's atomic consultant suggests development center and gives aims for regional program, which must be based on regional self-interest.

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Heavy-Duty Construction Helps Assure Service Continuity

At Clifty Creek Plant of the Indiana-Kentucky Electric Corporation, the use of 12 Allis-Chalmers vertical condenser circulating pumps for dry pit installation helps to assure service continuity and reduced maintenance.

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makes casing stronger and saves space — these are some of the features that make A-C circulating pumps popular throughout the power industry.

For the complete story on how Allis-Chalmers pumps can help you cut costs, contact your local Allis-Chalmers district office, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wis.

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Design and construction features like these assure dependable, day-after-day operation — better performance and low operating costs for you.

Benefit from Allis-Chalmers experience in building pumps for every industry. Industry-trained engineers are at your service to aid in selecting the right pump for your application. And, you can get the complete unit — pump, motor, control — from Allis-Chalmers.

ALLIS-CHALMERS



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Volume 75

Number 3



All-welded feedwater heater for new generating station will operate at 3200 psi with inlet steam temperature of 678° F. Designed and fabricated by The Lummus Company, the unit is the first of its

kind, is also the biggest heater ever built for operation at pressures above 3000 psi, having 12,710 square feet of tube surface in a single shell.

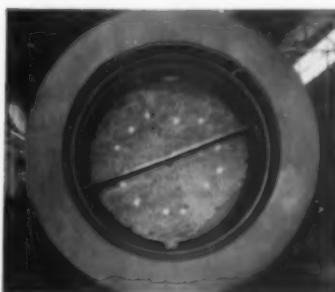
First All-Welded Feedwater Heaters Will Cut Generating Station Maintenance Costs

The first all-welded feedwater heaters ever built have been designed and fabricated by Lummus for the Linden Generating Station of the Public Service Electric and Gas Company of New Jersey. When completed, the installation will include 6 all-welded heaters, designed to operate at pressures well above 3000 psi, and 12 low pressure heaters which were all welded except for the tube to tube sheet joints.

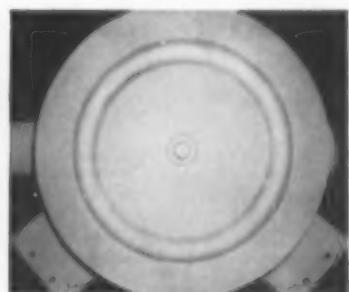
In addition, Public Service has just given Lummus a contract to supply feedwater heater requirements for their new Bergen Generating Station, duplicating in design the Linden units.

Welded construction minimizes leaks in tubes, shell and head. Thus the new units are expected to reduce materially the costly maintenance and downtime associated with failure of seals in bolted and gasketed constructions.

These unique heaters are the end result of over ten years of design and experimental work by The Lummus Company with all-welded fabrication. Perhaps this pioneering can help you reduce maintenance problems, too. For more information write The Lummus Company, 385 Madison Avenue, New York 17, New York.



Ends of cupro-nickel tubes are jointed to steel tube sheet by Inco '140' Monel Ni-Cu alloy electrodes. This alloy fuses well with both tube and sheet materials, forms strong, sound joint.



Closed head shows torus ring seal which is welded to channel and cover. Gasketed joint has been eliminated to avoid possibility of leakage. Design water pressure of unit is 3600 psi.



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SOUTHERN POWER AND INDUSTRY

Vol. 75
No. 3

MARCH, 1957

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Richard L. Priess Associate Editor

Milton C. May Field Editor

John F. Lee Consultant on Atomics

C. B. Washburn Editorial Assistant

*

J. A. Moody, Production Manager

*

BUSINESS REPRESENTATIVES

E. L. Rogers, 299 Madison Ave., New York 17,
N. Y.—Phone Murray Hill 2-4959.

George Isherwood, 590 Rutherford Dr., Springfield (Del. Co.), Pa.—Phone KI 3-0760.

J. D. Parsons, 39 Atlantic Ave., Cohasset, Mass.—Phone 4-0712.

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W. Cliff Rutland, P. O. Box 102, Gastonia, N. C.—Phone University 7-7995.

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Editorial and Executive Offices:

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Facts and Trends

FOR SOUTHERN INDUSTRIAL AND POWER EXECUTIVES

March 1, 1957

- ◆ CHECK STATIC SWITCHING as a new tool for industrial control systems. They cost more and are not intended to be complete replacements of control relays, but they offer a much higher degree of reliability and much longer life.

They are best applied when combinations of the following exist—frequent device operation, control systems reliability, complex control systems and bad atmospheric conditions. What they are . . . what they look like . . . how they work . . . benefits . . . and applications are featured in this issue.

Although industrial relays are now available with an expected life of up to 20 million operations, this life expectancy is inadequate for many applications. There are no moving or wearing parts in the Static Control components.

- ◆ FUEL OIL FREEZING?—Use of a tank heater to keep the oil in the storage tank warm, although necessary, is not always enough to prevent No. 6 fuel oil from freezing during a prolonged burner shutdown. To eliminate freezing in the pipes and clogging and gumming of the burner nozzle, York-Shipley, Inc., has designed a heating-circulating system especially for No. 6 oil.

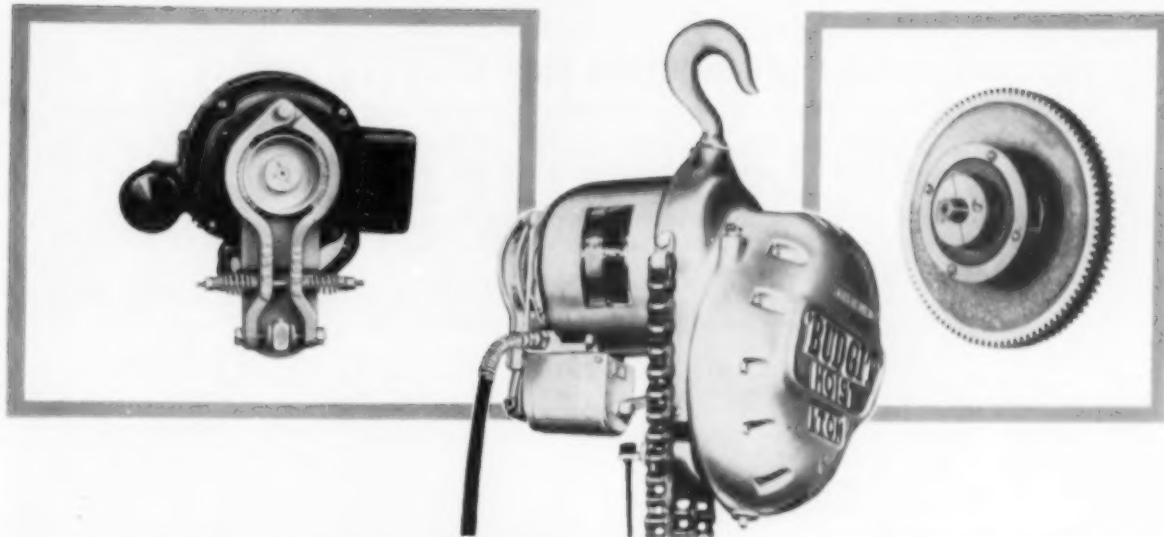
New heavy fuel heating system keeps oil in continuous circulation; compensates for variable viscosity; and heats burner nozzle.

- ◆ BURNING FLUID COKE—Steam and power for the huge Flying A Refinery of the Tidewater Oil Company at Delaware City, Delaware, is supplied by three Riley generating units having a rated capacity of 500,000 lb/hr at temperatures of 950 F and at 1425 psig. Generating units are owned and operated by the Delaware Power & Light Company. This is one of the first boiler installations specifically designed to use fluid coke as a primary fuel.

- ◆ PLASTIC PIPE JOINT LEAKS?—New fittings for cemented or solvent-welded pipe may help. On their Uscoweld plastic fittings, United States Rubber Co., is applying a thin layer of plastic on part of the inside wall. This layer, which makes the fitting socket slightly smaller than the pipe fitted into it, is dissolved by solvent cement when the joint is made and the pipe end can be pushed snugly into place. High contact pressure between fitting and pipe end then causes a positive leak-free welded joint. Weld is strong enough within seconds for ordinary handling.

- ◆ WORLD'S FIRST ELECTRIC WATCH announced by Hamilton is interesting enough in its own right—but the "small-button" size battery that makes it go "for over a year" may be even more interesting to engineers. Automation enthusiasts can do a lot of dreaming about uses for such a small dependable battery in miniturization of controls.

(Continued on Page 6)



POWERFUL **TWO-BRAKE** HOIST

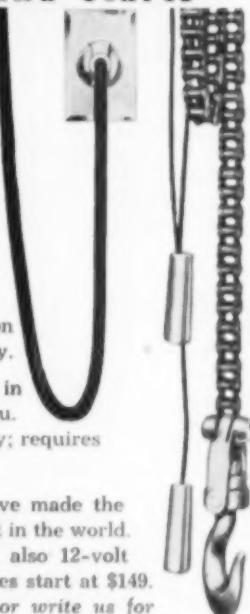
gives you greater **SAFETY**
plus "hairline" stops and starts

The 'Budgit' Electrical Hoist has a motor brake and a load brake. They operate simultaneously, automatically. Each alone is strong enough to hold the full load safely. Braking action is so quick, load-spotting time is greatly reduced.

The 'Budgit' is easy to operate with one hand. The other hand is always free to guide the load. You get fast Hoisting. A 500-lb. load can be lifted 1 foot in less than 2 seconds. Less hoisting time means less idle time for production machines. More units can be processed per day.

Installation is no problem. Just hang up, plug in and the 'Budgit' is ready to work and save for you. It uses only a few cents' worth of electricity a day; requires very little maintenance.

Ruggedness, efficiency, safety and economy have made the 'Budgit' Electric Hoist the most widely used hoist in the world. Capacities: $\frac{1}{8}$ to 2 tons. AC and DC models; also 12-volt battery-operated models for use on trucks. Prices start at \$149. Ask your "Shaw-Box" Distributor for details or write us for Bulletin 402.



FOR GREATER CONVENIENCE, USEFULNESS



I-Beam Trolley adds travel ability to any hoist. Bearing-equipped wheels roll smoothly. Fit various size I-beams. Capacities $\frac{1}{4}$ ton up. Priced from \$19.50.



Chain Container collects 'Budgit' tail chain neatly—keeps it out of the way. Holds up to 25 feet of chain. No drilling, no machining to install. Priced from \$17.00.



'Budgit' Cord Reel. Keeps conductor cord taut. Cord may be led off in any direction. Useful on any hoist or other motor device up to 1 HP. 25 and 50 foot cords. Priced from \$74.50.

Budgit **ELECTRIC HOISTS**



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Builders of "SHAW-BOX" and "LOAD LIFTER" Cranes, "BUDGIT" and "LOAD LIFTER" Hoists and other lifting specialties. Other Divisions produce "ASHCROFT" Gauges, "HANCOCK" Valves, "CONSOLIDATED" Safety and Relief Valves, "AMERICAN" and "AMERICAN-MICROSEN" Industrial Instruments, and Aircraft Products.

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Facts and trends (continued from page 4)

- ◆ ARE YOU FOULED UP? Demineralization units have been installed in many plants to produce high quality water for many industrial uses. Comparing the relative merits of this newest purifying method with conventional evaporating equipment will always bring support to both sides of the argument. There are advantages and disadvantages to each method.

Loss of capacity of the anion resins due to organic contamination in the water to be treated is one of the disadvantages of the demineralization method. In this issue of SPI, J. D. Ristropf, Chief Chemist-System of the Virginia Electric & Power Company reports on Demineralizers Decontaminated.

The case study of an instance of organic fouling of anion resins—the cause, effect, and a solution of the problem—will be of interest and help to plant engineers troubled with similar organic contamination.

- ◆ ATOMICS—A regional program must be based on regional self-interest and derive its major support from those groups which stand to profit from its benefits. In this issue, John F. Lee, SPI's Consultant on Atomics, outlines the aims for a regional atomic energy program. He also emphasizes that a development center is essential as a focal point for the implementation of the program.

The Nuclear Research Center recently completed for the Battelle Memorial Institute is cited as an ideal model for a regional center. Such a laboratory would constitute a complete facility available to Southern industry for nuclear research on a contract basis.

- ◆ INSTANT FUEL CHANGEOVER is featured in Dravo's new Counterflo space heater design. Burner automatically and interchangeably fires natural gas or light oil. For firing heavy No. 5 oil air atomization and a dual preheating system are employed which provide hot oil "right at the nozzle" before the burner attempts to light off.

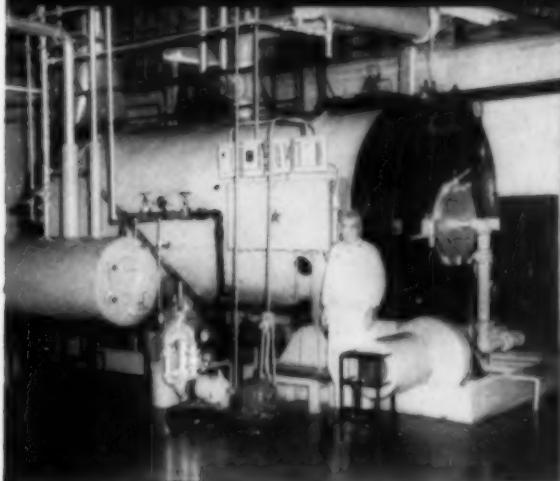
- ◆ MORE FUNCTIONAL PIPING ASSEMBLIES—interesting new cold extrusion techniques developed at Fluor Corporation's Paola, Kansas, plant, enable the fabrication of stronger, more functional piping assemblies. Unheated steel is subject to pressures of 100,000 to 400,000 psi, to force the metal, confined in a die, to flow around the contour of the die. Component parts that are being cold extruded formerly had to be hot-forged, cast, or flame-cut and fabricated by welding.

Advantages—smooth contours minimize pressure drop and reduce turbulence and erosion often found in stubbed-in construction; stresses distributed evenly; fit-up improved; closer dimensional tolerances; plus many production economies. Example—headers with openings at 90° of each other and with nozzle sizes ranging from 3 to 12 3/4" have been produced.

- ◆ COLOR-CODED GASKETS & SHIMS from General Gasket, Inc., come in a range of 12 gauges, each in a distinctive color so that you can select your thickness at a glance. Just pick the thickness you want, by color. .002 is red; .010 is brown; .025 is white, etc. It's called the Color-Plast system. Comes in gaskets, shims, spacers, etc., and in roll or sheet form. Needs no gasket cement since it is self-sealing.

Write the editors for additional information on any of the above items.
SOUTHERN POWER & INDUSTRY. 806 Peachtree St., N.E. Atlanta 8, Ga.

Some Typical Steam Problems Solved by **AMESTEAM** GENERATOR



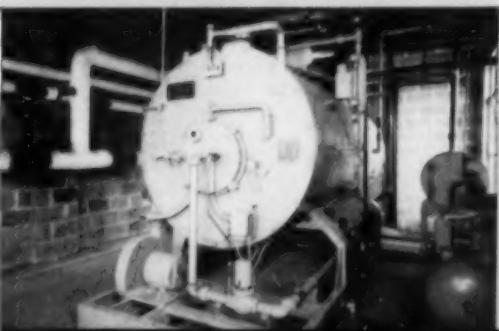
**“. . . EXTREMELY VARIABLE STEAM DEMAND
HANDLED SMOOTHLY AND EFFICIENTLY”** at St. Joseph
Paper Company, Houston, Texas. Writes C. J. Christman,
Plant Engineer:

“We have an AMESTEAM GENERATOR, 300 HP, 150#
W.P. in our plant. It has been in operation since January,
1949. We have an extremely variable steam demand, but
this boiler handles it smoothly and efficiently. Practically all
the original equipment is still in use and in first-class
operating condition. We have never had a leak in our boiler
or pipe installation during seven and one-half years of
uninterrupted service. The boiler is economical, maintenance
costs are very low, and we are completely satisfied.”



**“. . . BEST DOLLAR INVESTMENT WE HAVE MADE
TO DATE,”** reports Scranton Wiping Cloth Company.

“. . . of all the equipment we purchased last year to completely equip our new laundry facilities, which include your 150 HP heavy oil, high pressure automatic AMESTEAM boiler,” writes company official L. Light, “we can honestly state that the performance of this piece of equipment has been such that we now consider it the best dollar investment that we have made to date. From a fuel standpoint alone, our records indicate that it is costing us 51.7c per thousand
pounds of steam . . .” (not counting the maintenance labor savings enjoyed by this firm!).



“VERY SATISFACTORY” on lumber dry kilns is the report by J. S. Gudmundsson, Director, Foreign Trade Division of Wood-Mosaic Corporation, describing performance of the AMESTEAM GENERATOR at the firm's New Orleans yard.

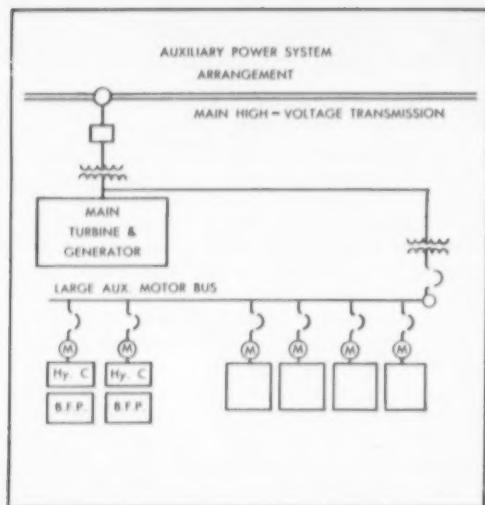
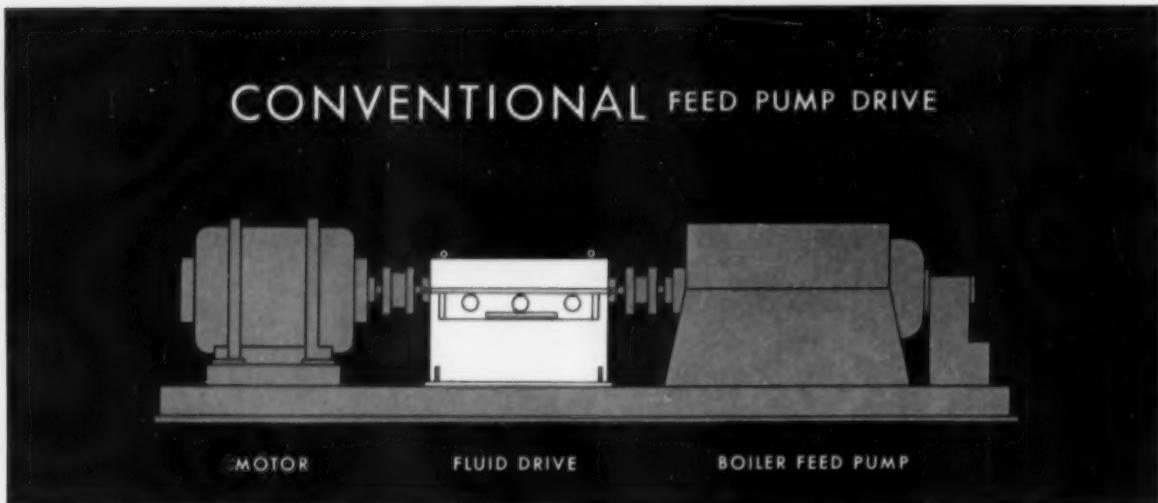
“The AMESTEAM GENERATOR we have there for running our lumber dry kilns has operated very satisfactorily, and we would specifically like to comment on the very excellent service that your representative has given us.”

WHAT'S YOUR STEAM PROBLEM?

If you need 10 to 600 HP and want the kind of space-saving, trouble-free service enjoyed by these owners of AMESTEAM Generators, write today for our catalog and the name of your nearby Amesteam dealer.

AMES **IRON**
WORKS INC.
BOX L-37 OSWEGO, N.Y.

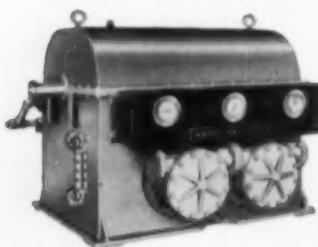
How Gýrol® Fluid Drive meets all



Of all power-plant auxiliaries, the boiler feed pump consumes the greatest single segment of invested power. To release more of this power to consumer lines, power plants of all sizes are controlling feed water flow by speed regulation through Gyröl Fluid Drive - driven by a constant speed prime mover.

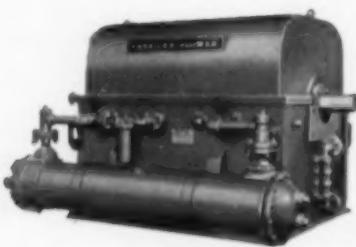
Gyrol Fluid Drive offers several specific advantages:

1. It saves power over the entire operating range by eliminating wasteful throttling by valves.
2. Fluid Drive's adjustable-speed feature permits reduction in pressure — resulting in further power savings.
3. It reduces wear on bearings, and other vital pump parts, by letting the pump operate at speeds that fit boiler demands.
4. With Fluid Drive, paralleling of pumps is simplified. Change-over from operating to standby pump is quick and easy.
5. Quiet operation is inherent in the design of Fluid Drive, since a "cushion of oil" is the means of energy transmission.



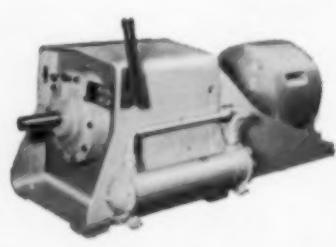
TYPE VS CLASS 6

- adjustable speed control
- 250 to 12,000 horsepower
- speeds to 3600 rpm



TYPE VS CLASS 4

- adjustable speed control
- 100 to 2500 horsepower
- speeds to 1800 rpm

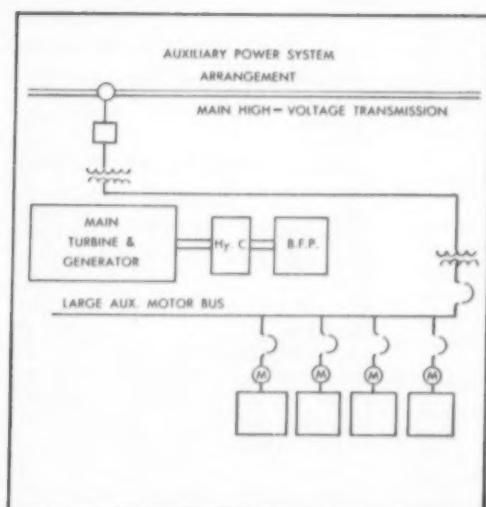
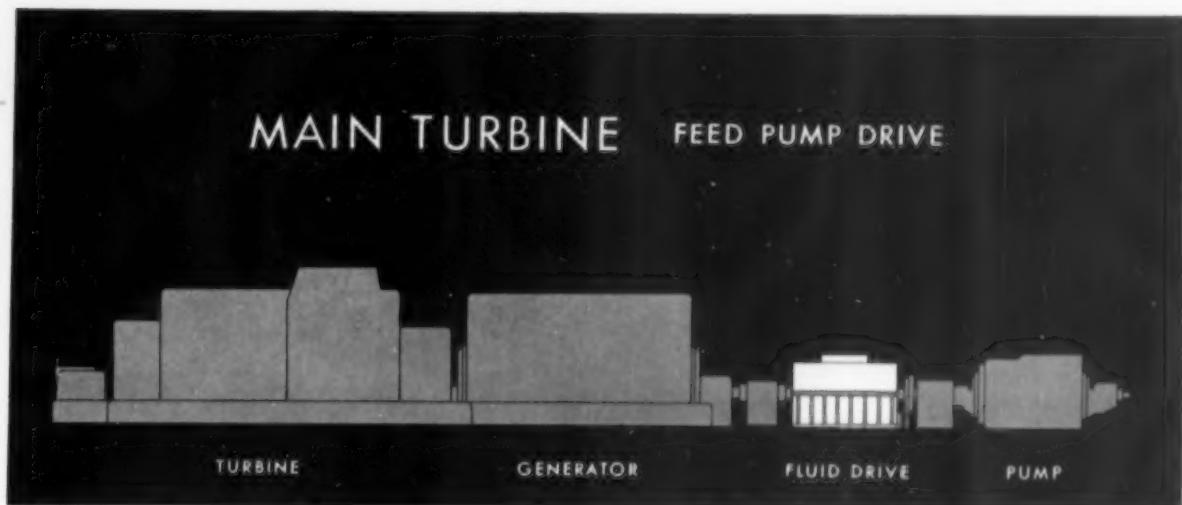


TYPE VS CLASS 2

- adjustable speed control
- 1 to 800 horsepower
- speeds to 1800 rpm

requirements for feed pump control

Regardless of station size, arrangement, or prime mover, you get the advantages of power savings, reduced pressures, and quiet operation with American Blower Gyrol Fluid Drives



Already in the construction stage is the use of Gyrol Fluid Drive for main turbine feed pump drives on some of the largest generating units yet projected.

For example, two of these stations will each drive, through a 12,000-hp adjustable-speed Gyrol Fluid Drive, the main feed pump from the high-pressure turbine. Full boiler capacities will be supplied by the single 5-stage pump, each delivering 6330 gpm against 6400 feet total discharge head when operating at 3510 rpm with feed water at 363° F.

Each pump requires an excess of 11,000 hp, and will be driven from the generator shaft through an adjustable-speed Gyrol Fluid Drive.

In your plans for expansion, why not discuss the advantages of Gyrol Fluid Drive with an American Blower engineer. His knowledge of this application in modern power plants may prove valuable to you. Call our nearest branch, or write: American Blower Division of American-Standard, Detroit 32, Michigan. In Canada: Canadian Sirocco products, Windsor, Ontario.

AMERICAN BLOWER

Division of AMERICAN-STANDARD



NEWS for the South and Southwest

New Chemical Construction

60% in South and Southwest

Survey shows: Where, Why and How Much

The chemical industry will spend an estimated \$2.5 billion on new domestic chemical construction through 1957 and 1958, according to a survey issued recently by Gen. John E. Hull, U.S.A. (Ret.), president of the **Manufacturing Chemists' Association, Inc.**

The MCA survey covers the number, type and estimated costs of privately financed facilities for the production of chemicals or for research. It does not include separate service facilities, such as office buildings, or warehouses, nor any chemical production or research facilities financed by public funds.

The MCA survey showed that domestic chemical construction projects brought into production during 1956 cost more than \$1.1 billion. These totaled 354 of the 700 projects included in the survey. An additional 278 projects now under construction will cost an estimated \$1.8 billion, and another 128 projects are definitely planned at an estimated cost of \$717 million.

These projects are being carried out by 327 companies. All those included in the survey are privately financed. The total cost of projects completed in 1956, plus those under construction or definitely planned for completion within the next two years, will be more than \$3.6 billion.

"This record construction of new facilities," said Gen. Hull, "clearly indicates the confidence of the chemical industry in the strength of the American economy."

"These large investments in new facilities are being made primarily because of the steady growth of demand for chemicals, both because of the expanding economy and because research is continually developing new uses for chemical products.

"Another important reason," said

Gen. Hull, "is that chemical companies are continually seeking to relieve pressures of higher costs and increasingly strenuous competition by investing in more efficient production units."

Geographical Distribution

The nationwide scope of the industry is indicated by the survey. The projects included are in 406 communities in 44 states.

The 18 states served by *Southern Power and Industry* account for \$2,164,676,000 of the total and 26 other states account for \$1,405,698,000. \$90,750,000 is in unspecified areas (see tabulation). Thus 61% of the expansion is in 18 Southern and Southwestern states (see tabulation).

Texas, which is the third ranking chemical producing state in the country, led in the number of projects included in the survey, with a total of 81 in the three categories of those completed in 1956, under construction, or planned. The total value of these projects is estimated at \$639,961,000.

Louisiana had the second largest figure, with a total of 39 projects in the three categories, with a total value of \$378,660,000. **California** was third, with 65 projects in 34 communities, with a total value of \$245,500,000.

Also ranked among the first 10, according to value of investment, were: **Florida**, \$237,925,000; **West Virginia**, \$229,495,000; **Ohio**, \$226,897,000; **Tennessee**, \$145,800,000; **Michigan**, \$141,350,000; **New Jersey**, \$139,125,000; and **Pennsylvania**, \$115,265,000.

Product Classification

Consolidation of national figures for facilities completed during 1956, under construction, and planned shows that the industry is currently making its largest investment, \$862

million, in organic chemicals. The second largest investment, \$16 million, is in the field of inorganic chemicals. The third largest, \$465 million, is for chemically produced metals or metallic compounds, exclusive of aluminum, processed uranium, copper, and ferroalloys.

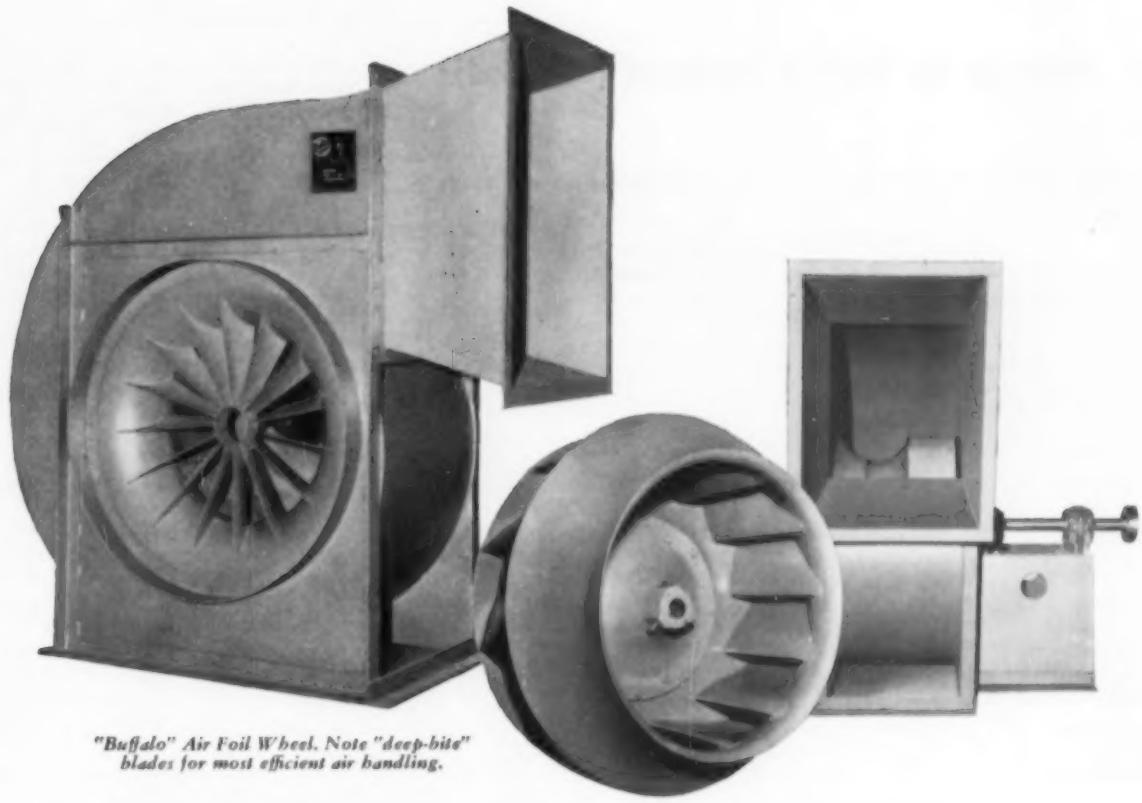
Investment in other product classifications are: fertilizer chemicals, \$407 million; plastics and resins, \$395 million; chemical fibers, \$279 million; synthetic rubber, \$210 million; basic chemicals from petroleum and natural gas, \$96 million; and miscellaneous chemicals, \$36 million.

Particularly significant is the fact that the chemical industry in 1956 completed new research facilities

Chemical Industry Construction Expenditures

(Includes totals of projects completed in 1956, plus those under construction and definitely planned)

State	Construction Cost (by \$1,000's)
Alabama	\$ 46,500
Arkansas	4,050
Delaware	9,700
Florida	237,925
Georgia	93,950
Kansas	8,750
Kentucky	81,720
Louisiana	378,660
Maryland	45,500
Mississippi	19,000
Missouri	82,000
North Carolina	17,600
Oklahoma	28,100
South Carolina	3,250
Tennessee	145,800
Texas	639,961
Virginia	91,715
West Virginia	229,495
Total	\$2,164,676
Other states	1,405,698
TOTAL	\$3,570,374
Unspecified Area	90,750
Total U. S. A.	\$3,661,124
Percent of Total in South and Southwest	$\frac{2,164,676}{3,661,124} = 61\%$
	3,570,374



"Buffalo" Air Foil Wheel. Note "deep-bite" blades for most efficient air handling.

New! "BUFFALO" "Deep Blade" AIR FOIL FANS a new high in forced draft performance

MOST STREAMLINED INLET — note smooth inlet bell matching the deep drawn wheel flange to form a "true half circle" inlet into wheel.

DEEPER BLADES FOR DEEPER "BITE" — note exceptionally deep blade design in photo at top. This improves air flow thru blade channels. Flanged hubs — smoothly curved for best air entry conditions.

The wheel has been dynamically tested in the "Buffalo" Vacuum Pit — possible only at "Buffalo". By spinning various rotor designs to destruction the optimum wheel

construction was determined — another "Buffalo" "Q" factor.*

IMPROVED FAN OUTLET — reduces outlet air turbulence from fan cutoff into duct by making more even, gradual change from velocity to static pressure. Without this complete streamlining of inlet, housing AND outlet, such high efficiency is impossible.



92% MECHANICAL EFFICIENCY — not an inflated claim, but proved performance you can expect in field operation.

WRITE FOR ALL ENGINEERING DATA AND RECOMMENDATIONS ON YOUR DRAFT PROBLEM

*The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.

BUFFALO FORGE COMPANY

BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.



VENTILATING AIR CLEANING AIR TEMPERING INDUCED DRAFT EXHAUSTING FORCED DRAFT COOLING HEATING PRESSURE BLOWING

SOUTHERN POWER & INDUSTRY for MARCH, 1957

For more information, use Reply Card — Page 89

11

News for the South & Southwest (Continued)

Expenditures by Category

Category	Total (by \$1,000's)
Fertilizer Chemicals	\$ 406,845
Inorganic Chemicals	816,039
Organic Chemicals	862,040
Metals	465,647
Petroleum & Nat. Gas	95,611
Plastics & Resins	394,617
Synthetic Rubber	210,050
Textile Fibers	278,900
Miscellaneous	36,000
Laboratories	95,375
TOTAL	\$3,661,124

at a cost of \$42 million, is currently building \$37 million more, and has definitely planned new facilities at an estimated cost of nearly \$16 million — a total of \$95 million.

U. S. Rubber—Kaiser Alum.

The wire and cable business of **United States Rubber Co.** has been sold to **Kaiser Aluminum & Chemical Corp.**, according to the board of directors of the rubber company. The sale included the plant, property and equipment in Bristol, R. I., H. E. Humphreys, Jr., chairman, announced. In addition, Kaiser Aluminum has taken over U. S. Rubber's wire and cable inventories, sales organization and distribution network.

Mr. Humphrey said U. S. Rubber has been considering getting out of the wire business for some time, since it is more closely allied to the metals field than to the rubber industry. He added that the company expects to continue to supply the rubber used for wire insulation at the Bristol plant.

C. T. Electrical—Fla.

C. T. Electrical Controls Ltd., who have been supplying controls and other electrical equipment to the Southern States, have decided to further expand their United States operations and have opened up a Field Office in **St. Petersburg, Florida**. "With the opening of a Field Office in St. Petersburg, we feel that our company will be in a much stronger position to fully service our many clients in the South," declared W. K. Roots, Managing Director for the Company. "Our service depot at Largo will continue to do repairs and all sales will be handled from St. Petersburg."

The St. Petersburg office is located at the Florida National Bank Building and is staffed by **Marvin Black** and **Bill Terrell**, both of whom are well known to the southern electrical industry. The C. T. Electrical Controls Ltd., are a division of the Pioneer Electric Ltd., of Winnipeg, manufacturers of all types of transformers and other heavy duty material.

Instrument Conference & Exhibit Atlanta Biltmore — April 10-12

The 3rd Southeastern Regional Conference and Exhibit of the Instrument Society of America is scheduled for **Atlanta, Georgia**, April 10-12, 1957. Exhibits, featuring displays by instrument manufacturers and Southeastern representatives, are being directed by National I.S.A. exhibit manager Fred Tabery.

The host Atlanta Section conference committee is headed by **Mike Dailey** of Atlanta's Rittelmeyer & Co., Inc. **Jack M. Spurlock** of Georgia Tech's Engineering Experiment Station is vice chairman. The Atlanta Biltmore Hotel will be the center of the Conference activities with the Exhibit Hall housing approximately 100 booths.

Program features include: a six-session industrial instrument maintenance clinic, nuclear power plant instrumentation; radiation measurement, instrumentation in the manufacture of nuclear fuels, etc. For additional information on the conference or exhibit contact **Mike Dailey, Rittelmeyer & Co.**, Box 1308, Atlanta 1, Georgia.

Exhibitors as of Feb. 11

Annin Co.
Applebee-Church, Inc.
Automatic Control Co.
Automatic Switch Co.
Automatic Temperature Control Co.
Barkesdale Valves
Barber-Colman Co.
Barton Instrument Corp.
Beckman Instruments, Berkeley Div.
Bishop Insulations
Bivins & Caldwell
Brooks Rotameter Co.
Burling Instrument Co.
Century Instrument Co.
Conax Corp.
Conoflow Corp.
Continental Equipment Co.
Control Equipment Co.

Crosby Steam Gage & Valve Co.
Lewis M. Crowe Co.
Hammel Dahl Co.
Daniel Orifice Fitting Co.
Daystrom Nuclear
Dezurik Shower Co.
Allen B. DuMont Labs.
Dressen-Barnes Corp.
Electro Products Laboratories
A. H. Emery Co.
Esterline Angus
Fenwal, Inc.
Fisher Governor Co.
Foxboro Co.
The Gearhart Co.
Claude S. Gordon Co.
Hastings-Raydist Co.
Hayden Engineering Sales Co.
HD Electric Current Transformers
Heineman Circuit Breaker

Helpot Corp.
Hewlett-Packard Co.
Hills McCanna Proportioning Pumps
E. G. Holmes & Associates
Illinois Testing Laboratories, Inc.
Imperial Brass Mfg. Co.
Industrial Equipment Co.
Industrial Instrument Corp.
Jerguson Gage & Valve Co.
Kiley and Mueller, Inc.
Lapp Insulator Co.
Leslie Co.
Litton Industries
J. E. Lonergan Co.
Magnetrol, Inc.
Manning, Maxwell and Moore
Mason-Nellon
Meriam Instrument Co.
Samuel Moore & Co.
Murphy and Cota
James G. Nichols Co.
Offner Electronics Corp.
Olmart Corp.
Palmer Thermometers
Panellit
Perkin Engineering Corp.
Polarad Electronics Corp.
Potter Aeronautical Corp.
Research Controls
Rittelmeyer & Co.
Robertshaw Fulton Controls Co.
Sanborn Co.
Scam Instrument Corp.
Security Valve Corp.
Sensitive Research Instrument Corp.
Servo Corporation of America
Simplex Valve & Meter Co.
Simpson Electric Co.
S. Morgan Smith Co.
Ward K. Stallings Co.
Triad Transformer Mfg. Co.
Tracerlab, Inc.
Trinity Equipment Corp.
Universal Controls Corp.
Varian Associates
Waveline Inc.
Weighing Components, Inc.
West Instrument Corp.

(Continued on Page 93)

ALL

100

General Motors • Standard Oil (N.J.) • Ford Motor • U.S. Steel • Chrysler • General Electric • Swift • Bethlehem Steel • Armour • Du Pont
(E.I.) de Noveaux • Gulf Oil • Western Electric • Socony Mobil Oil • Standard Oil (Ind.) • Texas Co. • Shell Oil • Westinghouse Electric
Goodyear Tire & Rubber • Standard Oil of California • National Dairy Products • Republic Steel • Union Carbide & Carbon • International Harvester
Firestone Tire & Rubber • Sinclair Oil • Radio Corp. of America • Procter & Gamble • U.S. Rubber • Cities Service • Phillips Petroleum • Douglas
Aircraft • Boeing Airplane • Aluminum Co. of America • General Foods • North American Aviation • Borden • International Paper • Goodrich (B.F.)
American Can • Eastman Kodak • United Aircraft Corp. • Jones & Laughlin Steel • Armco Steel • Sperry Rand • General Dynamics • Lockheed
Aircraft • Continental Can • Sun Oil • American Metal • Inland Steel • Wisco & Co. • Anaconda Co. • Allied Chemical & Dye • National Steel
Corp. • Youngstown Sheet & Tube • American Tobacco • Pittsburgh Plate Glass • Bendix Aviation • Internat. Business Machines • Olin Mathieson
Chemical • Borg-Warner • Kennecott Copper • Republic Aviation • American Smelting & Refining • Allis-Chalmers • National Lead • Continental Oil
Caterpillar Tractor • Monsanto Chemical • Burlington Industries • General Mills • Atlantic Refining • Curtiss-Wright • Pure Oil • Siblebaker-Packard
Tide Water Association Oil • Dow Chemical • Reynolds (R.J.) Tobacco • American Cyanamid • Internat. Tel. & Tel. • American Motors • Grace (W.R.)
Crown Zellerbach • Standard Brands • National Biscuit • Foremost Dairies • Ralston Purina • Reynolds Metals • Campbell Soup • Philip • Owens-
Illinois Glass • Marmitt-Chapman & Scott • Union Oil • Singer Manufacturing • Phelps Dodge • United Merchants & Manufacturers • Pillsbury Mills
Standard Oil (Ohio) • American Radiator & Standard Sanitary • Deere

of America's 100 largest industrial corporations are users of Clarge air handling and conditioning equipment.

CLARGE FAN COMPANY
KALAMAZOO • MICHIGAN

Source: The Fortune Directory • Published July 1956

Here's what makes Bronze Valves



TYPICAL OF WALWORTH QUALITY is the union body-to-bonnet connection which stiffens the body against internal pressure; makes taking the valve apart a simple operation and reduces the chances of distortion or leakage even though the valve is repeatedly taken apart and reassembled. With this type of construction there is no possibility of the bonnet coming off the valve while the handwheel is being turned.



HEAVY BODY CONSTRUCTION is typical of all Walworth Bronze Valves. Extra-thick walls and rugged wrench hexes constitute a high safety factor and prevent distortion while the valve is being installed in the pipeline. Extra-deep pipe threads are accurately machined to eliminate leakage. Walworth Bronze Valves are also available with flanged, silver-brazed or soldered ends in certain sizes and types.



MEET THE CHAMP! The chief engineer of a midwestern plant had used a parade of valves in severe boiler blowdown service. Most didn't last longer than 60 days. None survived 90 days.

On the recommendation of a Walworth Representative the engineer installed the Walworth No. 225P Bronze Globe Valve shown here, stating that he would be entirely satisfied if it lasted a bare three months. Exactly 4 years and 362 days later the valve was taken out of service—not due to the wire drawing, steam cutting and galling which made the other valves short-lived—but because the highly turbulent steam finally wore a small hole in the body.

This is the kind of valve satisfaction you get—when you specify and use Walworth Bronze Valves. They are the longest wearing, toughest bronze valves on the market.

Walworth Subsidiaries: ALLOY STEEL PRODUCTS CO. • CONOFLOW CORPORATION • GROVE VALVE AND REGULATOR CO.

Walworth *the* real bargain!



EXTRA-LARGE STEMS with extra-long, extra-deep threads prolong valve life, protect against wear and distortion and provide tight positive shutoff. The surface of the stem is machined to a glass-like finish for minimum handwheel effort and to preserve the packing which results in fewer inspections and less maintenance. The top of the stem is tapered and squared to hold the handwheel securely.

TO REDUCE WIRE DRAWING to a minimum, certain types of bronze globe valves have stainless-steel plug-type seats and discs heat-treated to a nominal hardness of 500 Brinell, adding years to valve life even in severe services. These valves can be tightly closed on sand, grit or pipe scale without damage. Seats and discs are machined simultaneously, assuring perfect mating.

There is a Walworth Bronze Gate, Globe, Angle or Check Valve for every service. Walworth is continually developing new valve types and materials, including plastics, to keep pace with the growing variety and severity of services in modern industry. For full information, see your Walworth Distributor or write:
Walworth, 60 East 42nd Street, New York 17, N. Y.



WALWORTH

Bronze Valves and Fittings

M & H VALVE & FITTINGS CO. • SOUTHWEST FABRICATING AND WELDING CO., INC. • WALWORTH COMPANY OF CANADA, LTD.

SOUTHERN POWER & INDUSTRY for MARCH, 1957

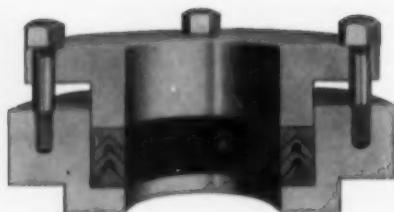
For more information, use Reply Card — Page 89

15

ONE OF THE GARLOCK 2,000



Why Garlock CHEVRON* Packing is really Automatic



This design is entirely different from ordinary V-type packings. CHEVRON has an exclusive hinge-like construction, assuring the automatic action for which it is designed.

This also permits the use of less packing in shallower stuffing boxes.

The unique construction of Garlock CHEVRON permits free operation of rods or plungers at all pressures. As pressures increase the packing automatically tightens to prevent leakages. As pressures decline the CHEVRON Rings instantly ease off permitting free operation without leakage.

Therefore, after you make initial adjustment of the gland, no further adjustments are needed

to compensate for variations in pressures.

Exclusive CHEVRON is one more part of "the famous Garlock 2,000" . . . two thousand different styles of packings, gaskets, and seals for every need—the only complete line. That is why you get *unbiased* recommendations from your Garlock representative. Call him today or write for CHEVRON Folder AD-115.

*Registered trade-mark

THE GARLOCK PACKING COMPANY, Palmyra, N. Y.

For Prompt Service, contact one of our 30 sales offices and warehouses throughout the U.S. and Canada.

GARLOCK



Packings, Gaskets, Oil Seals, Mechanical Seals,
Rubber Expansion Joints



To help find answers to your power generation problems before they occur



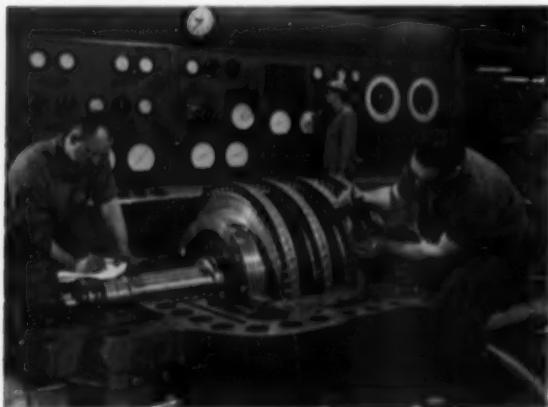


TURBINE-GENERATOR TESTING PROGRAMS are co-ordinated in G.E.'s Turbine-Generator Development Laboratory.

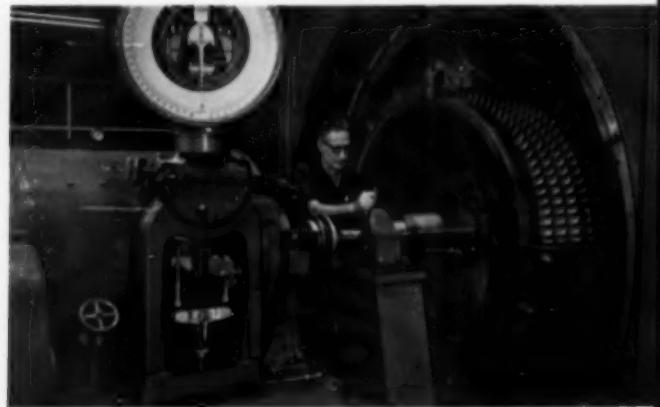
Tomorrow's problems are explored today IN GENERAL ELECTRIC'S TURBINE-GENERATOR DEVELOPMENT LABORATORY

Full-size turbine and generator parts and a great variety of development setups can be tested and evaluated for service performance at General Electric's Turbine-Generator Development Laboratory. Especially designed testing equipment—some described briefly on these pages—provides answers and engi-

neering data that could not possibly be obtained before. This Laboratory, now in full operation, is of vital importance to all large steam turbine-generator development engineering. It supplements the Large Steam Turbine-Generator Department's Materials and Processes, and Air Test Laboratories.



INCREASE TURBINE EFFICIENCIES—High-pressure test turbine provides precise operating data on new bucket, nozzle, rotor and shell designs, leading to higher efficiencies.



INCREASE GENERATOR RATINGS—To increase generator ratings without great physical size increase, more effective dissipation of heat must be provided by improvements in the fans and the cooling systems. Prototypes of fans designed to cool higher-rated generators are run in this full-scale fan test setup. A new fan is being tested here for a 300,000-kw unit. Pressure-volume characteristics and efficiency can be determined—information vitally needed for good fan design.

HIGH-SPEED BURST **PI** shown on preceding page spins turbine and generator rotor cross sections and reveals fracture characteristics and effects of physical configurations.

DETERMINE TURBINE EFFICIENCY—Accurate determination of overall efficiencies of new turbine designs is one of the most important considerations in building future turbines. And an inherent part of this problem is the development of more accurate flow nozzles. Here, the calibration of a water flow nozzle is being checked, using large, highly accurate scales and weigh tanks.



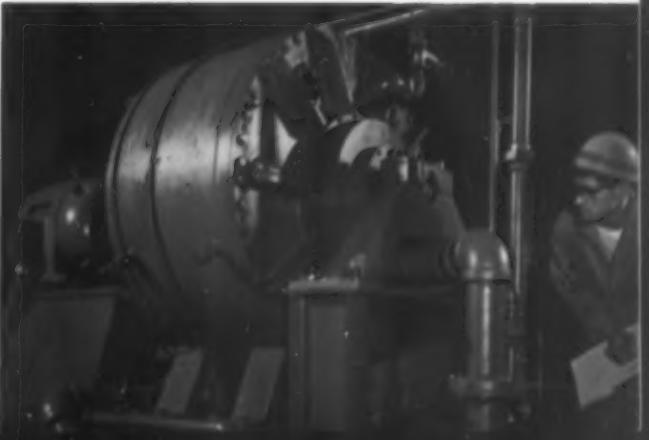
IMPROVE THRUST BEARING DEPENDABILITY—Thrust bearings of larger capacity are required for the larger turbines being designed. The machine shown here is used to test new thrust bearing designs. Operating at 1800 or 3600-rpm, it can impose loads up to 450,000 lbs—equivalent to the weight of the Statue of Liberty. It is also used to measure oil and babbitt temperatures, and oil film pressures and thicknesses under conditions tougher than those encountered in actual operation. This machine has proved the dependability of General Electric thrust bearings.



INCREASE GENERATOR INSULATION LIFE—Insulation is one of the most important factors affecting the life of a generator. That is why General Electric conducts extensive research aimed at prolonging insulation life. On this special "girth crack" test setup, a generator stator bar is subjected to simulated operating conditions. Thermal expansion is duplicated and ten years of operating cycles are condensed into four months of testing. Engineers can study and design new insulation systems that will reduce operating difficulties.

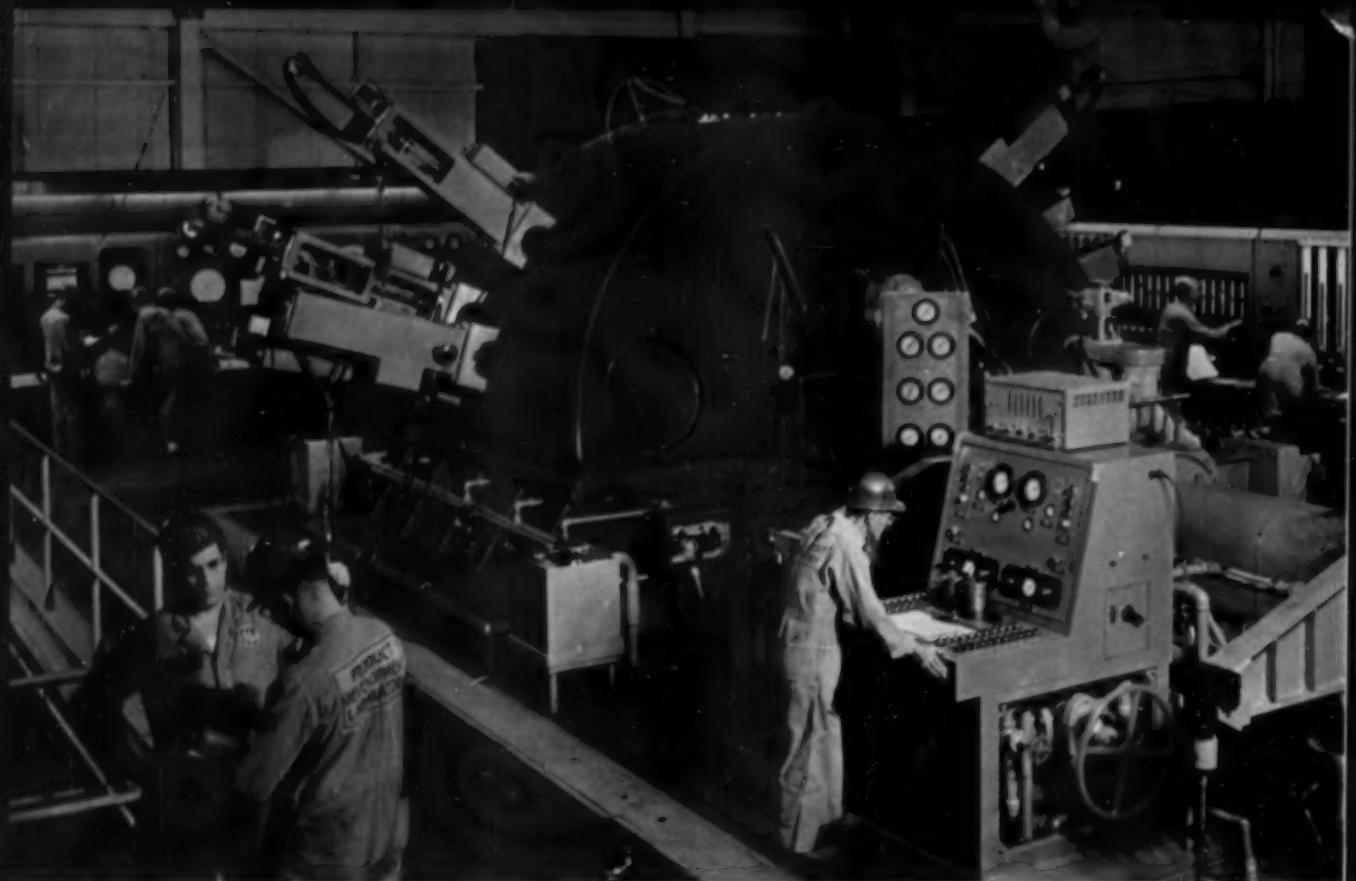


SIMPLIFY HYDROGEN SYSTEM—With this test set up General Electric engineers are working to develop a new shaft seal to permit the application of the continuous scavenging system on all generators regardless of size. This system requires no vacuum treatment of the oil.



Progress Is Our Most Important Product

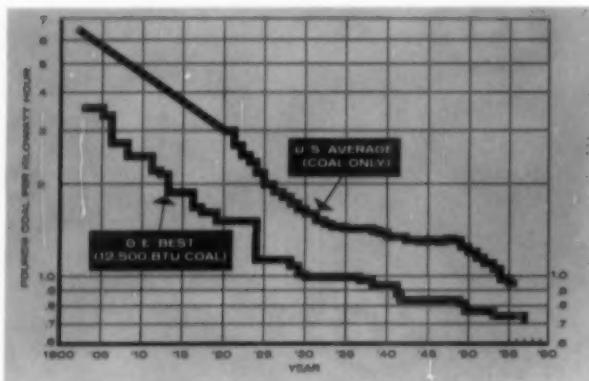
GENERAL  **ELECTRIC**



FULL-SCALE, LOW-PRESSURE TEST TURBINE enables G-E engineers to evaluate new design concepts and to study turbine steam paths under actual operating conditions.

IN GENERAL ELECTRIC'S DEVELOPMENT LAB

Low-pressure turbines get critical study



STATION COAL RATE chart shows rapid progress in electrical equipment efficiency. U.S. average is from FPC reports, compared with station coal rates for G.E.'s most efficient units.

As the rating of steam turbines has continued to increase, a greater proportion of a unit's output is being produced by the low-pressure section. In addition, the advent of nuclear power has further established the importance of efficient use of the energy in this region.

The solution to problems in the low-pressure section can be evaluated in the Turbine-Generator Development Laboratory's full scale, low-pressure test turbine. Here the largest 3600-rpm turbine parts built by General Electric can be run under actual operation conditions.

With facilities like these, G-E engineers can solve power generation problems before they occur—so that tomorrow's turbine-generators will be even more efficient. For more information write for bulletin GED-2554, Large Steam Turbine-Generator Dept. General Electric Co., Schenectady 5, N.Y. 254-47

Progress Is Our Most Important Product

GENERAL  **ELECTRIC**

FISHER

TAILOR MADE

for Heater
Drain Control



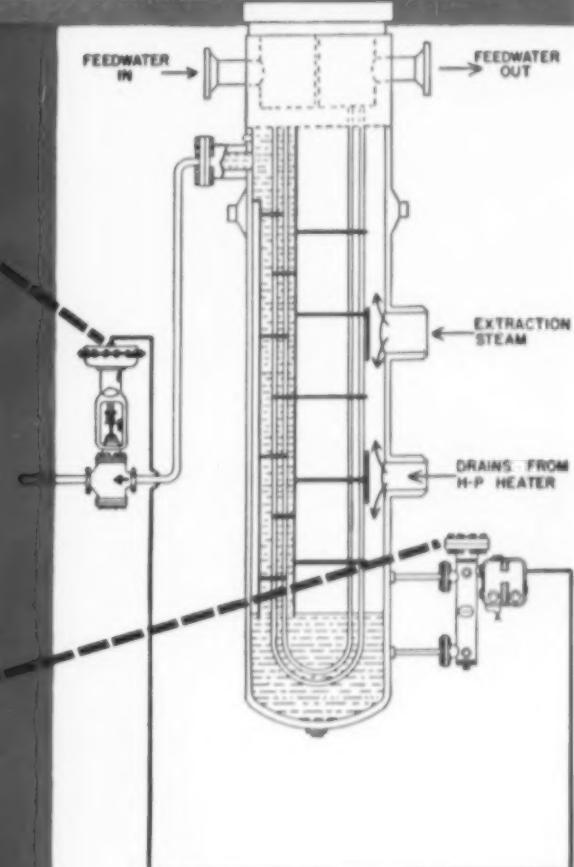
TYPICAL SPECIFICATIONS:

TYPE NUMBER: 657A
BODY END CONN: 2" Welding End
BODY MATERIAL: C-5 Carbon Alloy
VALVE TRIM: 316SS, Sintered seal welded rings
INNER VALVE: Double port Throttle Plug
PACKING: Teflon
All to Diaphragm—3 to 15 psi



TYPICAL SPECIFICATIONS:

TYPE NUMBER: 2500B—259B
CAGE MATERIAL: WCB Steel
EQUALIZING CONN: Top and bottom, F.T.
CONNECTION SIZE: 2" 600 lb. ASA Flgd.
FLOAT SIZES: 3" x 14"
FLOAT MATERIAL: 304 St. Steel
TORQUE TUBE: K-merei



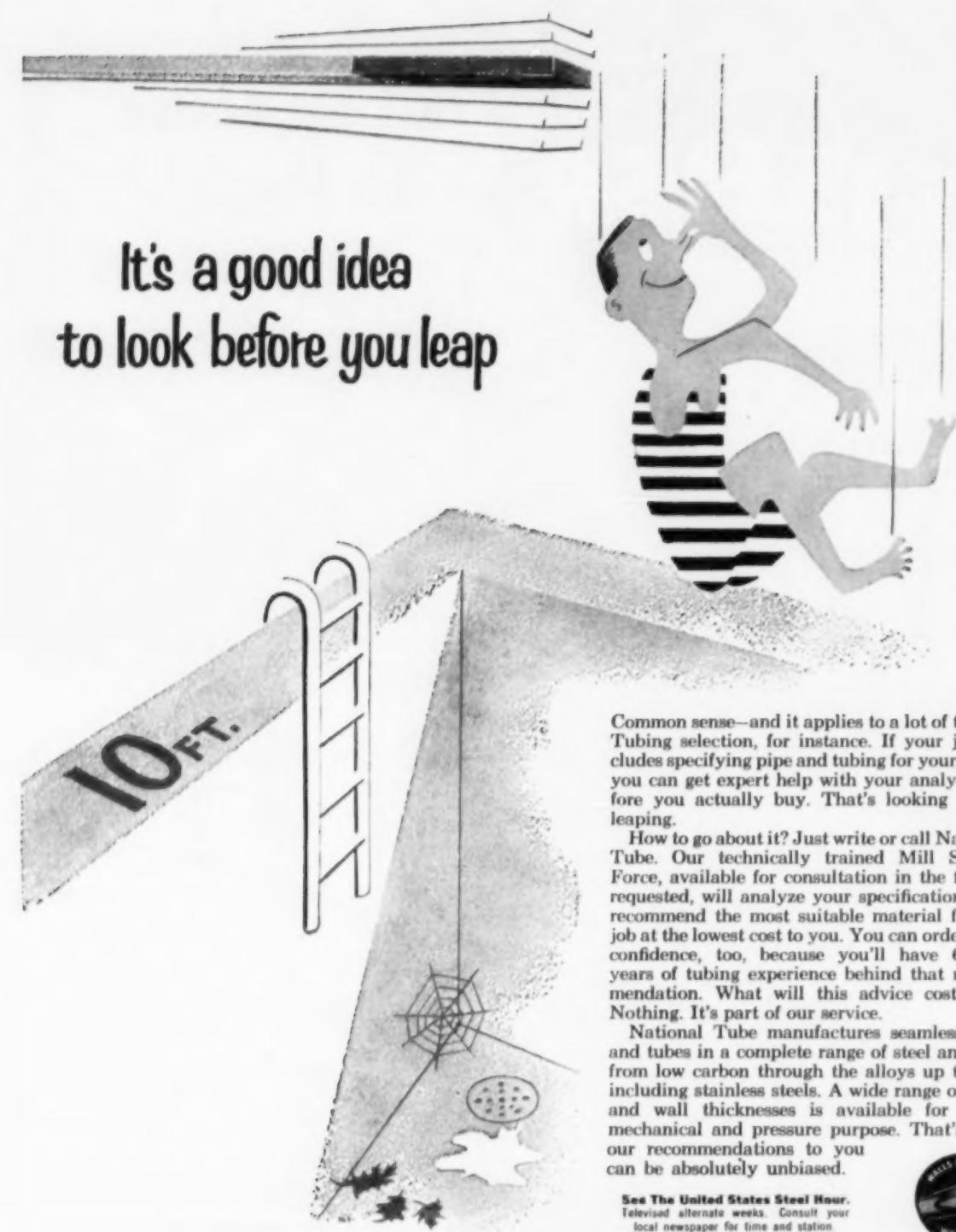
Years of experience in supplying control valves and Level-Trols to steam and power plants has supplied Fisher with the knowledge and ability to build heater drain equipment that will stand up, year in and year out, with a minimum of maintenance.

FISHER GOVERNOR COMPANY • MARSHALLTOWN, IOWA

CANADIAN PLANT: WOODSTOCK, ONTARIO

WORLD LEADER IN RESEARCH FOR BETTER PRESSURE AND LIQUID LEVEL CONTROL

FISHER
Since 1880



It's a good idea
to look before you leap

Common sense—and it applies to a lot of things. Tubing selection, for instance. If your job includes specifying pipe and tubing for your plant, you can get expert help with your analysis before you actually buy. That's looking before leaping.

How to go about it? Just write or call National Tube. Our technically trained Mill Service Force, available for consultation in the field if requested, will analyze your specifications and recommend the most suitable material for the job at the lowest cost to you. You can order with confidence, too, because you'll have 60-odd years of tubing experience behind that recommendation. What will this advice cost you? Nothing. It's part of our service.

National Tube manufactures seamless pipe and tubes in a complete range of steel analyses from low carbon through the alloys up to and including stainless steels. A wide range of sizes and wall thicknesses is available for every mechanical and pressure purpose. That's why our recommendations to you can be absolutely unbiased.

See The United States Steel Hour.
(Tubing Specialties)
Televised alternate weeks. Consult your
local newspaper for time and station.



NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.

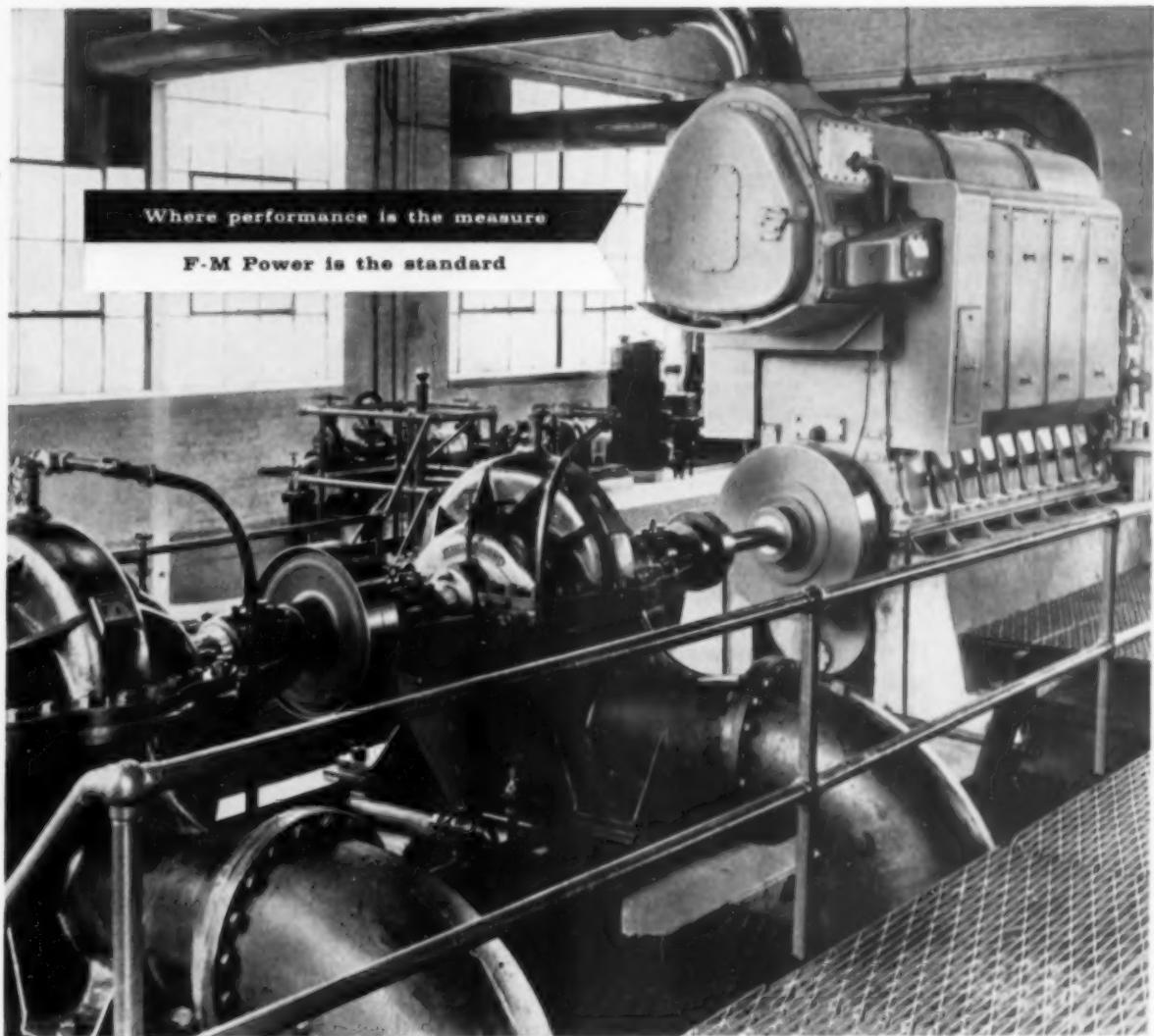
(Tubing Specialties)

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS • UNITED STATES STEEL EXPORT COMPANY, NEW YORK



NATIONAL SEAMLESS PIPE and TUBES

UNITED STATES STEEL



Where performance is the measure

F-M Power is the standard

Latest addition to Greensboro's F-M power-pumping team which includes two 14", three 20" and one 16" single-stage, double-suction, centrifugal pumps. All are driven by O-P diesels totaling 3175 hp.

Greensboro Saves *46,300 Yearly with Fairbanks-Morse Power-Pumping Team

Increased capacity at operating costs that are lower by 55%—that is the record set by 3100 hp. of Opposed-Piston diesels and the six F-M pumps they drive in the water system of Greensboro.

Such a "required standard" of performance has been set by F-M diesel and dual fuel engines in all

classes of municipal service the country over. Apply the measure of performance to your power requirements and see what the F-M standard of dramatic economies in operating costs can save you.

Fairbanks, Morse & Co., Department SPI-3,
Chicago 5, Illinois.



FAIRBANKS-MORSE

a name worth remembering when you want the BEST

DIESEL AND DUAL FUEL ENGINES • DIESEL LOCOMOTIVES • RAIL CARS • ELECTRICAL MACHINERY • PUMPS • SCALES • HOME WATER SERVICE EQUIPMENT • MOWERS • MAGNETOS

RILEY TURBO

solves six major central

Problem 1: **How to eliminate slagging on furnace walls and on other heating surfaces.**

Solution: Intertube Directional Flame Burners used with the Riley TURBO FURNACE are placed on one elevation, immediately above the furnace floor and are arranged for opposed firing. Combustion is substantially completed at the bottom of the combustion chamber. The upper furnace envelope area serves the purpose of cooling combustion gas to the required temperature for superheater and reheat. Combustion gas rises vertically in the secondary furnace without stratification and without impingement on furnace walls.

Problem 2: **How to reduce carbon loss to the minimum.**

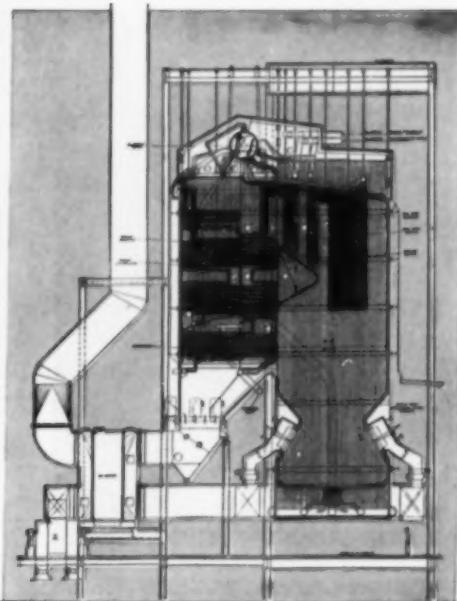
Solution: The combustion zone of the Riley TURBO FURNACE is a chamber of high temperature, long residence time, and extreme turbulence. Here pulverized coal particles are completely consumed with most of the ash reduced to molten slag.

Problem 3: **How to eliminate flyash disposal.**

Solution: The almost negligible trace of flyash carried in the flue gas of the Riley TURBO FURNACE is collected in rear pass hoppers and dust collectors and reinjected thru the burners for reburning of combustibles and final disposal as molten slag. Molten slag is quenched and removed as in any conventional slag tap furnace.

Problem 4: **How to change from gas and oil to solid fuels firing at less cost.**

Solution: Conventional type steam generating units designed to burn gas or oil must be taken out of service for extensive and costly alterations when converting to solid fuels firing. Because furnace exit gas temperatures are substantially the same for all fuels fired in the Riley TURBO FURNACE, immediate conversion to solid fuels without change to furnace and heating surfaces is possible.



FURNACE

station problems

Problem 5: How to obtain uniform heat distribution to steam heating surfaces.

Solution: The vertical direction of combustion gas leaving the TURBO FURNACE burning zone uniformly within the area of the vertical furnace walls insures equal furnace exit gas temperature from side to side and front to rear. Uniform heat absorption by superheater and reheater elements is thus assured.

Problem 6: How to reduce operating costs.

Solution: Burners on large conventional central station boilers are usually placed at several levels requiring complicated facilities for operation and supervision. Riley's TURBO FURNACE Directional Flame Burners are all located near the bottom of the furnace on one level. Plants can be designed so that the turbine, burner platform and control room are all on one floor level. Complete automatic electronic burner controls with fool-proof safeguards against flame failure are available for remote operating control.

Riley TURBO FURNACE boilers have been sold for capacities over one and one half million pounds of steam per hour. The operating characteristics of Riley TURBO FURNACES assure efficient performance when burning coal, oil, fluid coke, delayed coke, gas and lignite individually or in combination.

A survey of your plant by a consulting engineer could show ways of making surprising savings in your power costs.

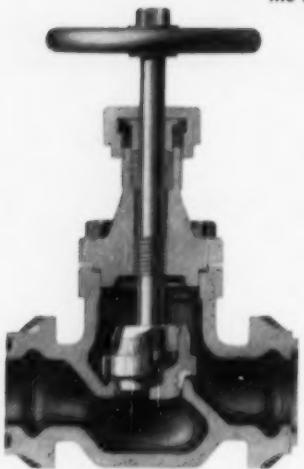
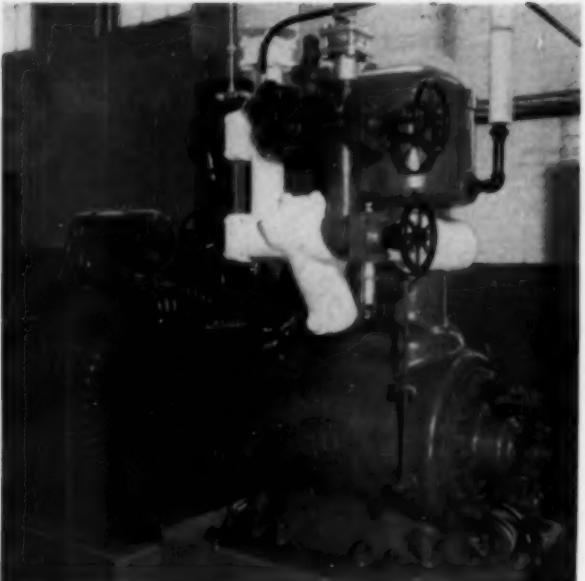
 **RILEY**
Stoker Corporation
WORCESTER, MASSACHUSETTS

Sales Offices: Worcester, New York, Philadelphia, Buffalo, Pittsburgh, Cleveland, Detroit, Chicago, Cincinnati, Charlotte, New Orleans, Atlanta, St. Louis, Kansas City, St. Paul, Houston, Denver (Englewood), Salt Lake City, Los Angeles, San Francisco, Portland, Seattle.

For the Ultimate in Ammonia Equipment Specify



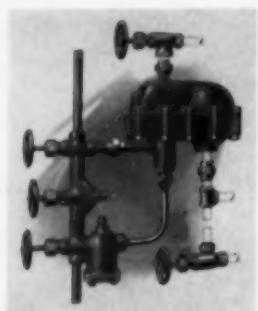
Frick Enclosed Ammonia Compressors—The Standard of the Refrigeration Industry



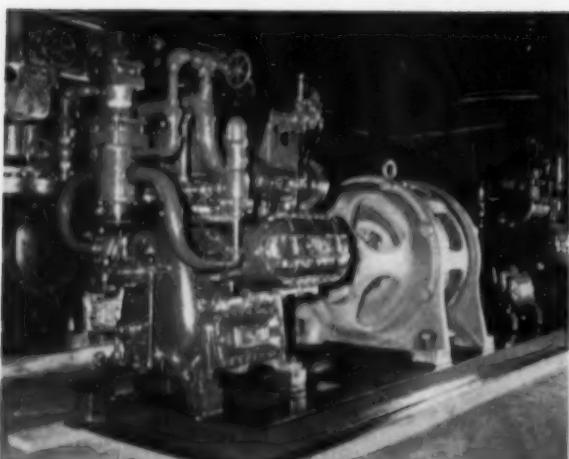
Frick Valves Have High-angle Seats and Oversized Stems, Are Good For Many High-pressure Jobs



Condensers, Coils and Coolers Are Furnished in All Types and Sizes



Float Control Valve with By-pass Manifold and Strainer



"ECLIPSE" Ammonia Booster and High-Pressure Machines Have Multiple Cylinders, High Running Speeds

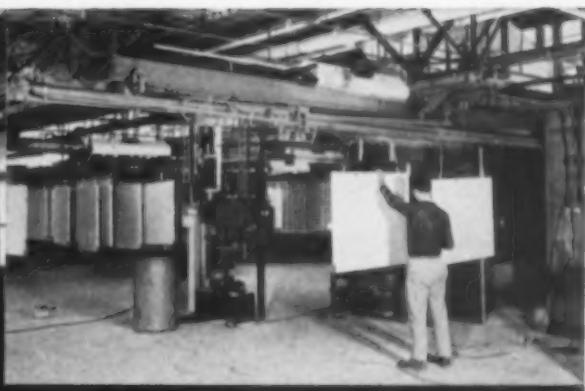
Whether you need a compressor, condenser, cooler, coil or control—you get only the most dependable when you insist on equipment bearing the Frick trademark. Generations of experience with ammonia refrigeration are back of our recommendations and products: write for literature and estimates on your requirements.

DEPENDABLE REFRIGERATION SINCE 1882
FRICK CO.
 WAYNESBORO, PENNA. U.S.A.

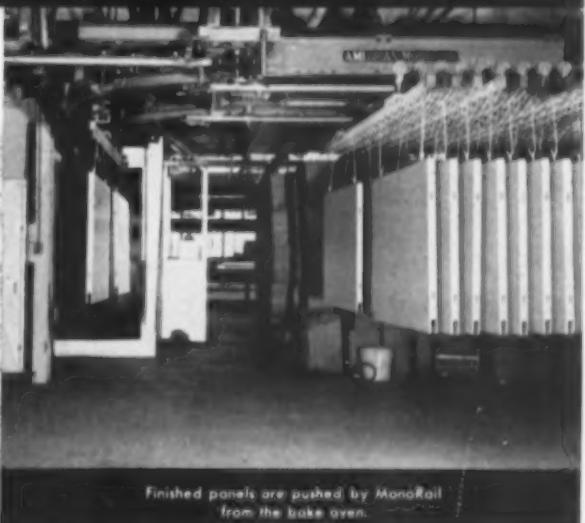
Also Builders of Power Farming and Sawmill Machinery



Landahl picks up panels as MonoRail pushes them from degreasing.



MonoRail pneumatically pushes a "car" of panels into a finish spray booth.



Automatic Finishing
with
Power **LANDAHL**
and
AMERICAN MONORAIL

Space was saved and automatic finishing achieved by combining two overhead handling systems.

American MonoRail cars carrying metal panels move through degreasing, priming, finishing and baking. In each operation either loading or unloading is performed automatically by power — the Landahl Chainless Conveyor acting as a "pusher" over most of the system.

Here is "team work" engineering to take advantage of the flexibility of both American MonoRail and Landahl Chainless Conveyors.

This efficient system is installed at Fostoria, Mfg. Co., Fostoria, Ohio, for finishing metal panels for office partitions.

For details on how American MonoRail or Landahl Conveyors can cut your handling costs, write today.

Member of The Materials Handling Institute, Inc. & MonoRail Manufacturers' Association.

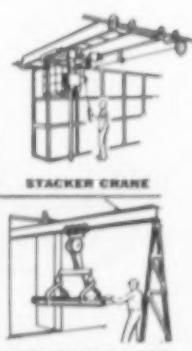
For Power Driven Conveyors, Use Landahl Chainless Conveyors



AMERICAN
MONORAIL
COMPANY

13105 ATHENS AVENUE, CLEVELAND 7, OHIO (IN CANADA—CANADIAN MONORAIL CO., LTD., GALT, ONT.)

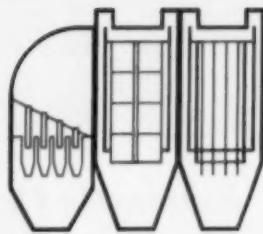
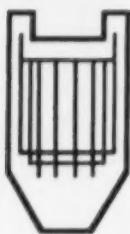
MANUAL MONORAIL



The industry's most experienced organization in dust, fume and fly ash recovery

—as near as your telephone!

Because the Western Precipitation Corporation stands alone in its years of continuous leadership in the complex science of recovering suspensions from industrial gases, Western Precipitation installations, quite naturally, are recognized throughout the world as the best obtainable. . .



■ Almost a half-century ago—in 1907 to be exact—Western Precipitation installed the first commercial application of the now-famous Cottrell Electrical Precipitator—and has more know-how, more varied experience and application background in world-wide installations in this type of equipment than any other organization, domestic or foreign.

■ Many years ago Western Precipitation was first again with the multiple small-diameter tube type of cyclonic collector—the type with higher centrifugal forces for greater recovery efficiencies. And through the years, Western Precipitation engineers have continuously led in new advancements, new refinements in the mechanical recovery field as well as in electrical recovery methods.

■ Western Precipitation was the first to combine Electrical and Mechanical recovery advantages in one compact, co-ordinated system—the CMP (Combination Multicloner—Precipitator) Unit. This equipment, offering almost constant collection efficiency despite varying gas volume, requires years of experience in both electrical and mechanical recovery methods for proper operating "balance".

...only Western Precipitation has had such extensive experience in basic recovery methods!

These are only a few of the many important reasons why a Western Precipitation installation is recognized as the best obtainable. This unequalled know-how is quickly available throughout the major industrial areas of the United States and Canada from strategically-located, fully-staffed offices and field representatives, as shown at right. There's one as near as your telephone.

So before you finalize any dust, fume or fly ash recovery plans, be sure to find out the vital *extra* advantages offered by Western Precipitation Corporation!



For literature describing Western Precipitation's unique background of experience and advancements, phone, wire or write our nearest office.



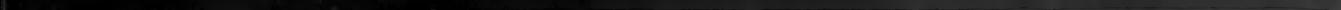
COTTRELL Electrical Precipitators
MULTICLONE Mechanical Collectors
CMP Combination Units
DUALAIRE Reverse-Jet Filters
HOLD-FLITE Processors

Western Precipitation Corporation

Designers and Manufacturers of Equipment for Collection of Suspended Material from Gases
... and Equipment for the Process Industries

Main Offices: 1052 WEST NINTH STREET, LOS ANGELES 15, CALIFORNIA

Chrysler Building, New York 17 • 1 North La Salle Street Building, Chicago 2 • Oliver Building, Pittsburgh 22 • 3252 Peachtree Road N. E., Atlanta 5 • Hobart Building, San Francisco 4
Precipitation Company of Canada Ltd., Dominion Square Building, Montreal
Representatives in all principal cities



BEACON COAL

EASTERN GAS AND FUEL ASSOCIATES

PITTSBURGH • BOSTON • CLEVELAND • DETROIT • NEW YORK
NORFOLK • PHILADELPHIA • SYRACUSE

For New England: New England Coal & Coke Co., For Export: Castner, Curran & Bulitt, Inc.



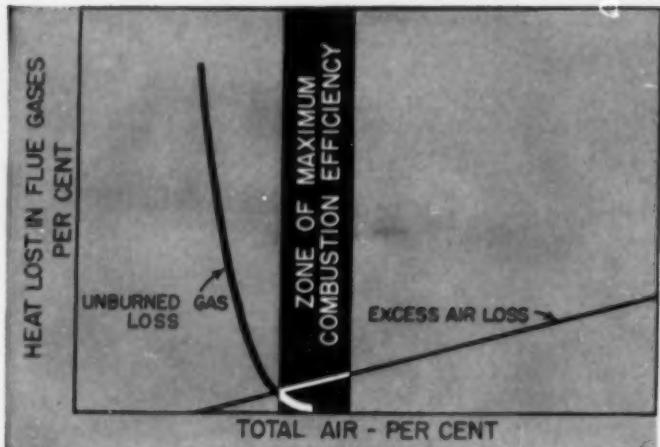
How to get maximum combustion efficiency... measure both combustibles and oxygen

Simultaneous measurement of both oxygen and combustibles is needed to obtain optimum combustion. No instrument that measures only one of these two interdependent factors can give you the full information necessary.

Now, Bailey offers two units, each giving a continuous and simultaneous double check on combustion efficiency: a permanent analyzer-recorder which records both factors on a single chart; and a new light weight, portable unit which indicates both factors.

Both instruments measure: (1) excess air—regardless of the fuel or combinations of fuel being burned, (2) mixing efficiency of your fuel burning equipment by showing per cent combustibles in the flue gas.

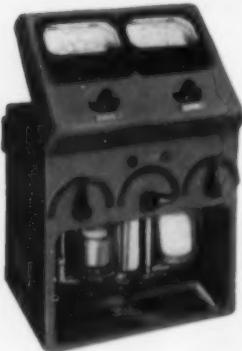
Both units are designed to increase efficiency in the furnace operations of the steel industry, on glass tanks, cement and lime kilns, ceramic and refractory kilns, steam boilers and also on direct and indirect-fired furnaces in the metal processing industries. To prevent your money from becoming waste gas, look



Maximum Combustion Efficiency is secured by keeping the sum of Excess Air Loss and Unburned Gas Loss to a minimum. To do so by the direct method simply measure both oxygen and combustibles in flue gas.

into these two efficiency provers. A Bailey engineer will be glad to give you details or write us for product specifications.

For portable use— HEAT PROVER Analyzer



The famous Cities Service HEAT PROVER analyzer is now Bailey built and sold. Weighing only 25 pounds, it is a self-contained automatic analyzer including a sampling tip and hose plus a thermocouple for temperature measurement.

Instrument dials are dual range for greater accuracy and sensitivity.

For permanent installation Oxygen-Combustibles Recorder



The Bailey Oxygen-Combustibles Analyzer-Recorder coordinates both records on one chart. These records enable the operator to keep fuel burning equipment performing continuously in the zone of maximum combustion efficiency. Excess air may be reduced to the point where combustibles begin to show.

G 40-1

Instruments and controls for power and process

BAILEY METER COMPANY

1028 IVANHOE ROAD

• CLEVELAND 10, OHIO

In Canada—Bailey Meter Company Limited, Montreal





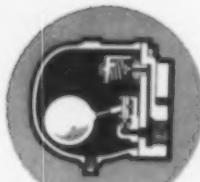
1 Sarco TD Thermo-dynamic Steam Trap

Self-adjusting for 10-600 psi
...no head or seat change or
adjustment... Practically no
maintenance: 1 moving part
...stainless steel disc. Only 3
parts: cap, body, disc. All
stainless steel. Cat. 257.



2 Sarco Balanced Pressure Thermostatic

Greatest capacity per dollar
cost. Large air venting capacity.
Same head and seat,
0-300 psi. Freeze-proof. Cat.
250-A



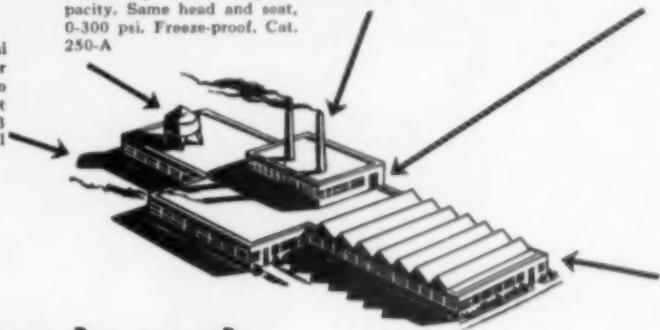
3 Sarco Float-Thermostatic

Discharges condensate con-
tinuously at steam tempera-
ture and without shock. Re-
sponds immediately to vary-
ing loads and pressures. Cat.
450-A



4 Sarco Camlift Bucket

New, powerful Camlift valve
mechanism permits greater
discharge with no increase in
size of trap body. Cat. 360-A



5 Sarco Liquid Expansion

Adjustable to discharge
condensate **B BELOW** 212° F.
Freeze-proof. Not affected by
water-hammer or pressure
pulsations. Cat. 260-A.

How to get efficient steam trapping ... throughout your plant

With these **5 Basically Different Types** of Sarco Steam Traps you can select the trap with the characteristics that match your **specific job conditions**.

Just because a steam trap discharges condensate and air and closes to steam doesn't necessarily mean it's doing a good job. For maximum efficiency, a trap must also keep conditions within the steam spaces right for the heat transfer job to be done.

For example: A Bucket Trap will work on a unit heater—but its discharge is intermittent. Between discharges, condensate collects in the small steam space of the heater causing undesirable changes in air temperature. The continuous dis-

charge Float-Thermostatic Trap will, however, keep the heating surface free from condensate *all the time*—insure uniform air temperature.

That's why no one type of steam trap can give best trapping results under all job conditions. And that's exactly why Sarco makes **5 basically different types** of steam traps—each with a different set of operating characteristics.

Solve Your Trapping Problems

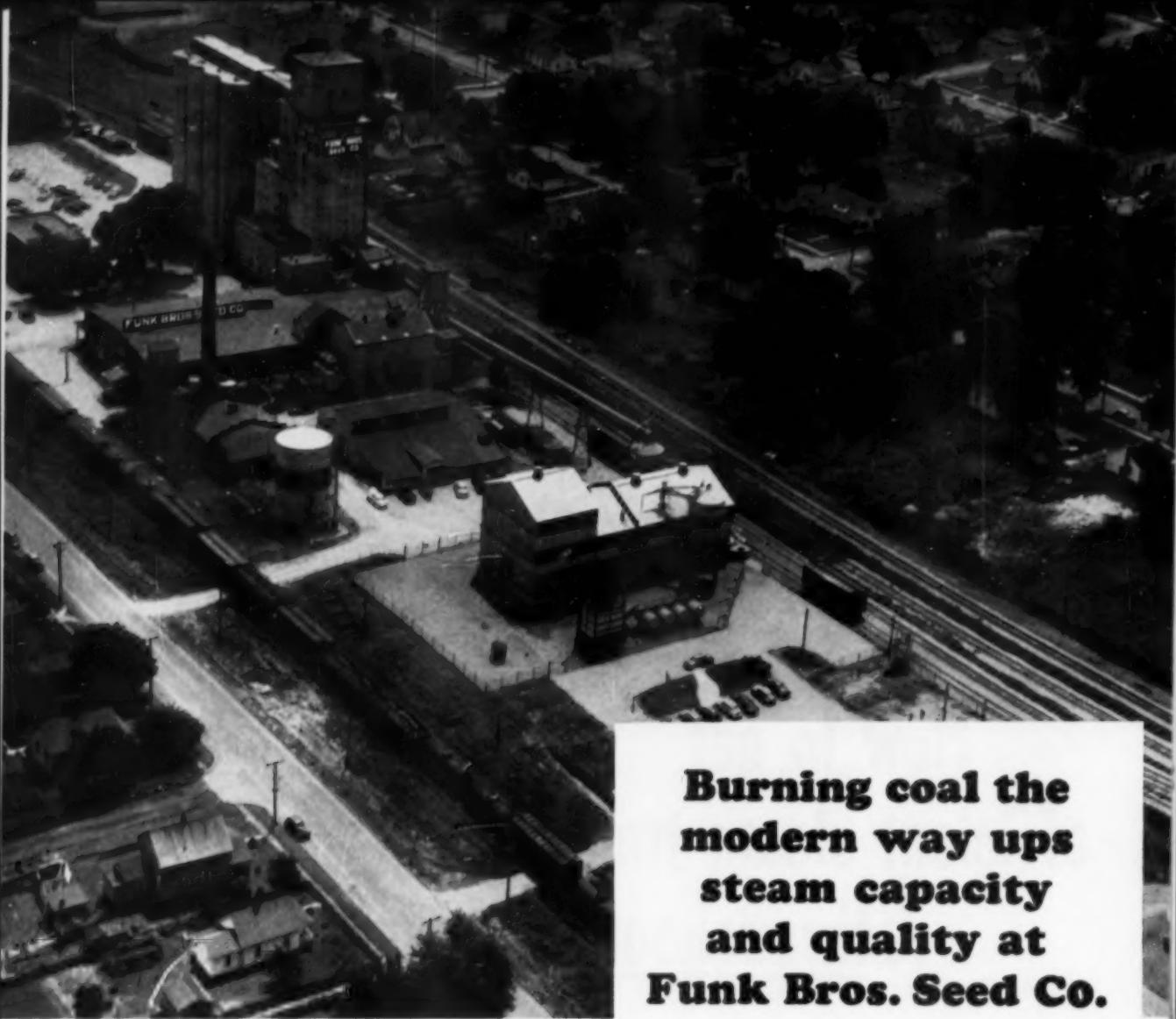
And because Sarco makes all 5 types—not merely variations of one type—you can always get *impartial* advice from Sarco, based on over 43 years of field experience. Write to your local Sarco representative or to Sarco Company, Inc., Empire State Building, New York 1, N. Y.

ONLY
SARCO

makes **all 5 types of steam traps**

—not merely variations of one type!

8100-6



Burning coal the modern way ups steam capacity and quality at Funk Bros. Seed Co.

Consult an engineering firm

Designing and building hundreds of heating and power installations a year, qualified engineering firms can bring you the latest knowledge of fuel costs and equipment. If you are planning the construction of new heating or power facilities—or the remodeling of an existing installation—one of these concerns will work closely with your own engineering department to effect substantial savings not only in efficiency but in fuel economy over the years.

facts you should know about coal

In most industrial areas, bituminous coal is the lowest-cost fuel available • Up-to-date coal burning equipment can give you 10% to 40% more steam per dollar • Automatic coal and ash handling systems can cut your labor cost to a minimum. Coal is the safest fuel to store and use • No smoke or dust problems when coal is burned with modern equipment • Between America's vast coal reserves and mechanized coal production methods, you can count on coal being plentiful and its price remaining stable.

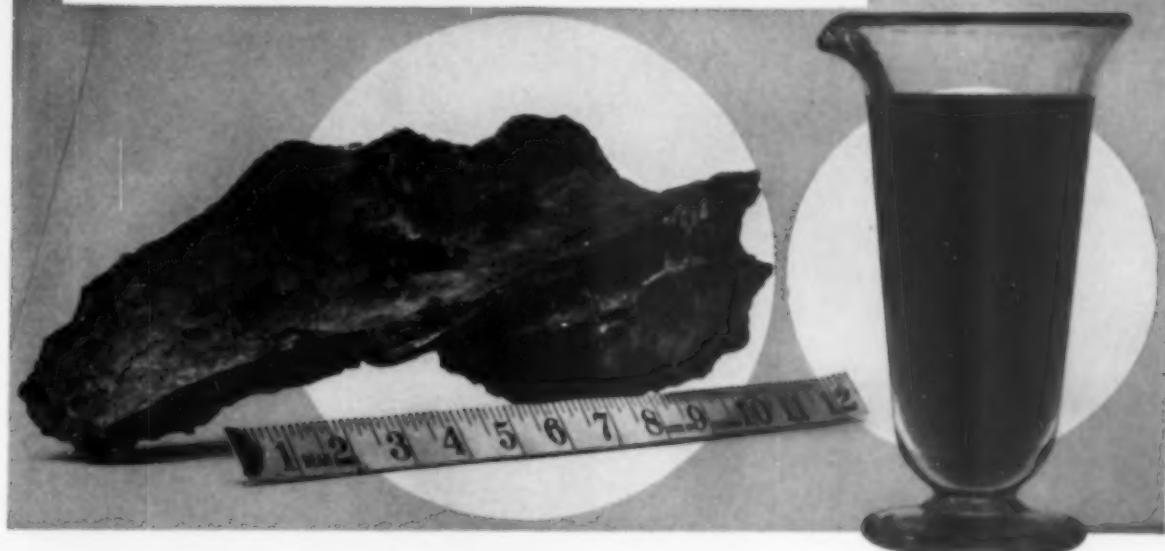
As Funk Bros. Seed Co., Bloomington, Ill., increased the capacity of its soybean extraction plant 50%, the firm's old steam plant proved inadequate. Not only was it unable to produce enough steam, but steam quality was not suitable for best processing conditions. To remedy this situation, the company installed a new 26,000 lbs./hr. boiler, automatic controls, automatic coal and ash handling system and related equipment.

Today the steam plant at Funk Bros. requires only one man per shift, holding one of the most attractive operating jobs in the plant. Evaporation rates are in excess of 9 lbs. of steam per lb. of coal and there is adequate high quality steam for further expansion requirements. Also cleaner plant conditions resulting from this modernization have greatly improved community relations.

For further information or additional case histories showing how other plants have saved money burning coal, write to the address below.

BITUMINOUS COAL INSTITUTE
Southern Building • Washington 5, D. C.

HEAVY SCALE IS REDUCED TO LIQUID BY ANCO SCALE REMOVER



Eliminates Scale Quickly in Boilers, Water Lines Refrigeration and Air Conditioning Systems

Even heavy scale formation is dissolved in a few hours by ANCO SCALE REMOVER. In the case of air conditioning and refrigeration equipment, no shutdown is necessary. This efficient dry formula works while the system is in operation. No damage to equipment. ANCO SCALE REMOVER is harmless to metal surfaces and will not irritate workmen's skins.

In the complete ANCO line of water-treating products, there's a formula for virtually every condition. And there's an

ANCO Service Engineer in your area who will gladly discuss any of your water problems and make recommendations based on careful analyses. No cost or obligation.

ANCO COOLEX

keeps air conditioning and refrigeration condensers free of scale. This inexpensive, effective formula also protects metal surfaces against rust and corrosion, maintains low head pressure and maximum operating efficiency.

Write, Wire or Call

SPECIALISTS IN MAKING
WATER BEHAVE



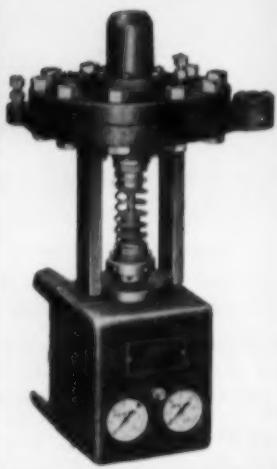
Anderson Chemical Company, INC.

Box 1424 • MACON, GEORGIA • Phone: 5-0466

Here's the *pilot* with
the sense to save *dollars*



Close Control



Leslie Type LA-2
Level Control Pilot

EXTRACTION TYPE FEEDWATER HEATER DRAIN CONTROL

This Leslie liquid level controller is installed in heater drain service in a Midwest utility station. You will also find Leslie liquid level controllers in condenser hot well service, de-aerating heater installations and boiler level control.

Leslie Floatless Level Control Pilots sense changes in liquid level that will help you maintain peak output. You save maintenance dollars, too — forget troublesome floats and cages (there aren't any).

With low resolution sensitivity (.1 of an inch change in liquid creates response), you are assured of smooth, throttling action and a closely held level.

There are Leslie Pressure Control and Temperature Pilots with the sense to save dollars in pressure and temperature control stations, too. Your Leslie Engineer, listed under "Valves or Regulators" in your classified directory, will be glad to help you.

Send for Bulletin 5303 on Leslie Control Pilots

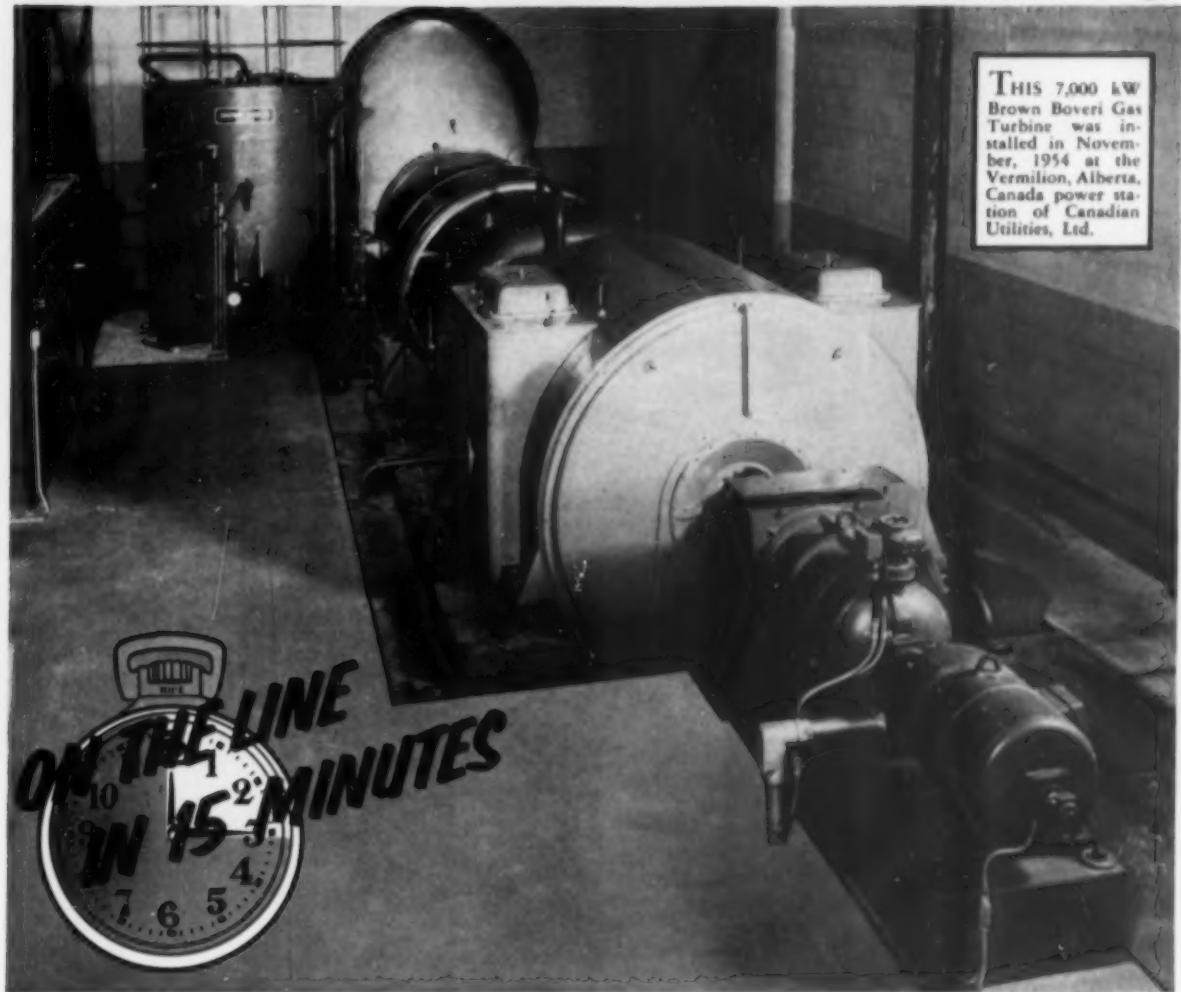


REGULATORS AND CONTROLLERS
LESLIE CO., 261 GRANT AVENUE, LYNDHURST, NEW JERSEY

F 2873

CONTROLLED QUALITY MEANS QUALITY CONTROLS

MEET PEAK LOAD DEMANDS



THE Brown Boveri 7,000 kW single shaft gas turbine is the answer to the rigid demands of *Peak Load* service. Relatively no warm-up time is required . . . full load can be reached in 15 minutes or less from a cold start.

In-the-field performance records of over 50 such units — in peak and base load service throughout the world — prove their economy of operation. They require a minimum of manpower and maintenance; they burn gaseous or liquid fuel; and they effect economies in building construction, foundations and overall capital outlay.

Whether yours is the problem of peaking or base load service you'll find it profitable to investigate Brown Boveri Gas Turbines.

Full details available for the quality- and economy-minded. Send for them NOW!

BROWN BOVERI CORPORATION
19 RECTOR STREET • NEW YORK 6, N. Y.



Atlanta, Ga. • Birmingham, Ala. • Boston, Mass. • Buffalo, N. Y. • Butte, Mont. • Chicago, Ill. • Cleveland, Ohio • Denver, Colo. • Detroit, Mich. • Hamilton, Ont. • High Point, N. C. • Houston, Tex. • Jacksonville, Fla. • Kansas City, Mo. • Knoxville, Tenn. • Louisville, Ky. • Miami, Fla. • Minneapolis, Minn. • New Orleans, La. • New York, N. Y. • Pasadena, Calif. • Portland, Ore. • Sacramento, Calif. • San Francisco, Calif. • Seattle, Wash. • Somers, N. Y. • Tampa, Fla.



All high and low pressure steam piping for the 225,000-kw turbine-generator at Appalachian Electric Power Company's Glen Lyn, Virginia, station was fabricated and erected by M. W. Kellogg—using local union labor. Initial steam conditions are 1050 F, 2000 psi, with reheat at 1050 F. Main steam lines are 2 1/4% chrome-1% molybdenum, 12 1/4 in. OD, 2 1/4 in. average wall thickness. To meet the exacting requirements of both American Gas and Electric Service Corporation and The M. W. Kellogg Company, close control of techniques and procedures was doubly important.

At Glen Lyn, as elsewhere in the field, M. W. Kellogg's reputation for completing a power piping project efficiently and promptly is due to the right techniques, the right materials, the right equipment, and—equally important—the right men to train and supervise labor to Kellogg's special standards. We welcome the opportunity to demonstrate these unique abilities and facilities. Some of them, including K-Weld®, are described in our 12-page booklet, "For The Modern Central Power Station." Write for your copy.

KELLOGG'S

FIELD CONTROL

KEEPS PACE

(Above) An inspector on Kellogg's permanent staff supervises welding of main steam lines at the Glen Lyn Station. (Below) Controls for the gang of 40-kva stress relieving units at Glen Lyn provide a permanent record of preheating, concurrent heating, and stress relieving cycles, ranging from room temperature to 1350 F.



Fabricated Products Division

The M. W. Kellogg Company, 711 Third Avenue, New York 17, N. Y.

A SUBSIDIARY OF FULLMAN INCORPORATED

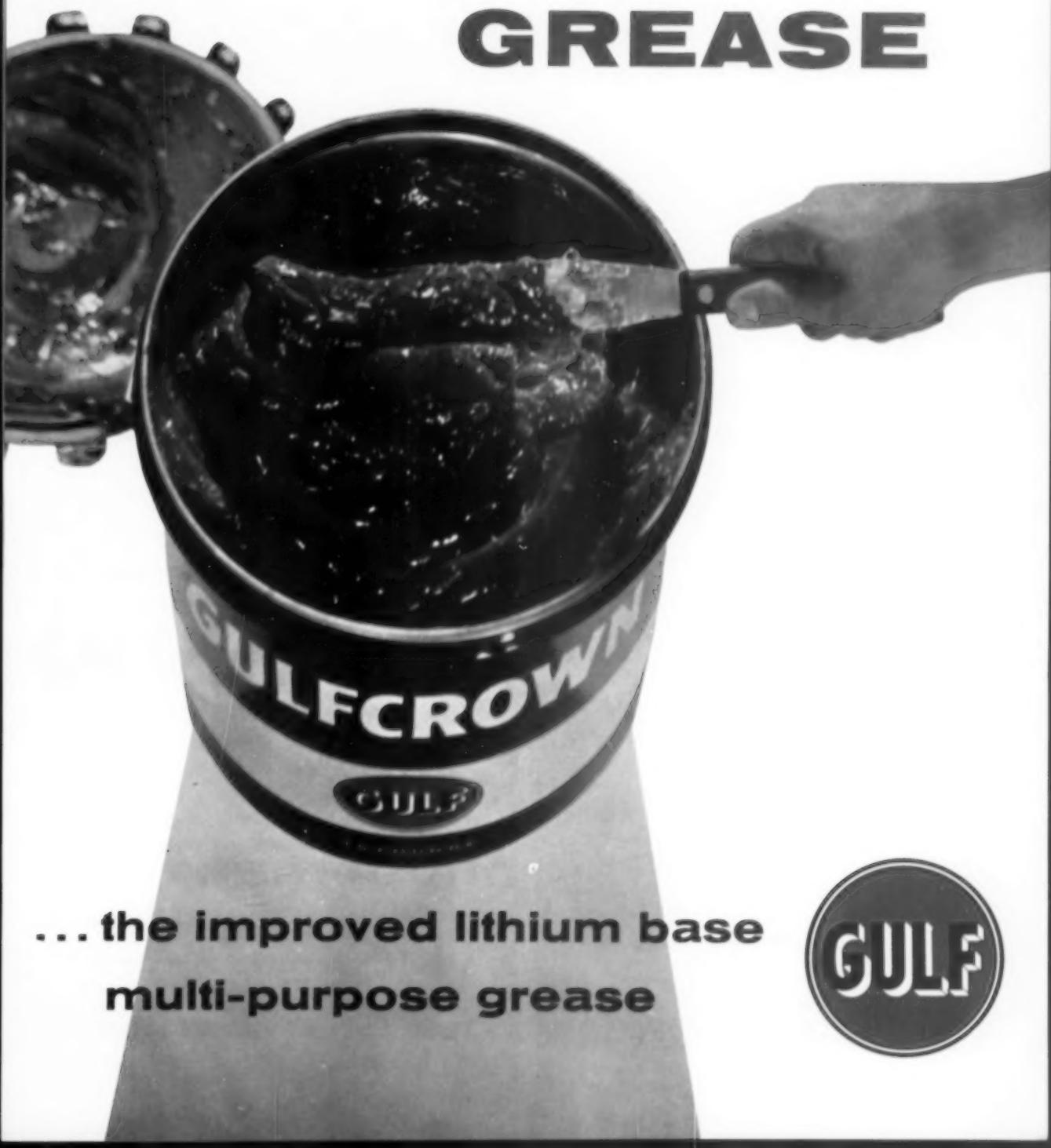
The Canadian Kellogg Company Ltd., Toronto • Kellogg International Corp., London
Kellogg Pan American Corp., New York • Societe Kellogg, Paris
Companhia Kellogg Brasileira, Rio de Janeiro • Compania Kellogg de Venezuela, Caracas



POWER PIPING—THE VITAL LINK

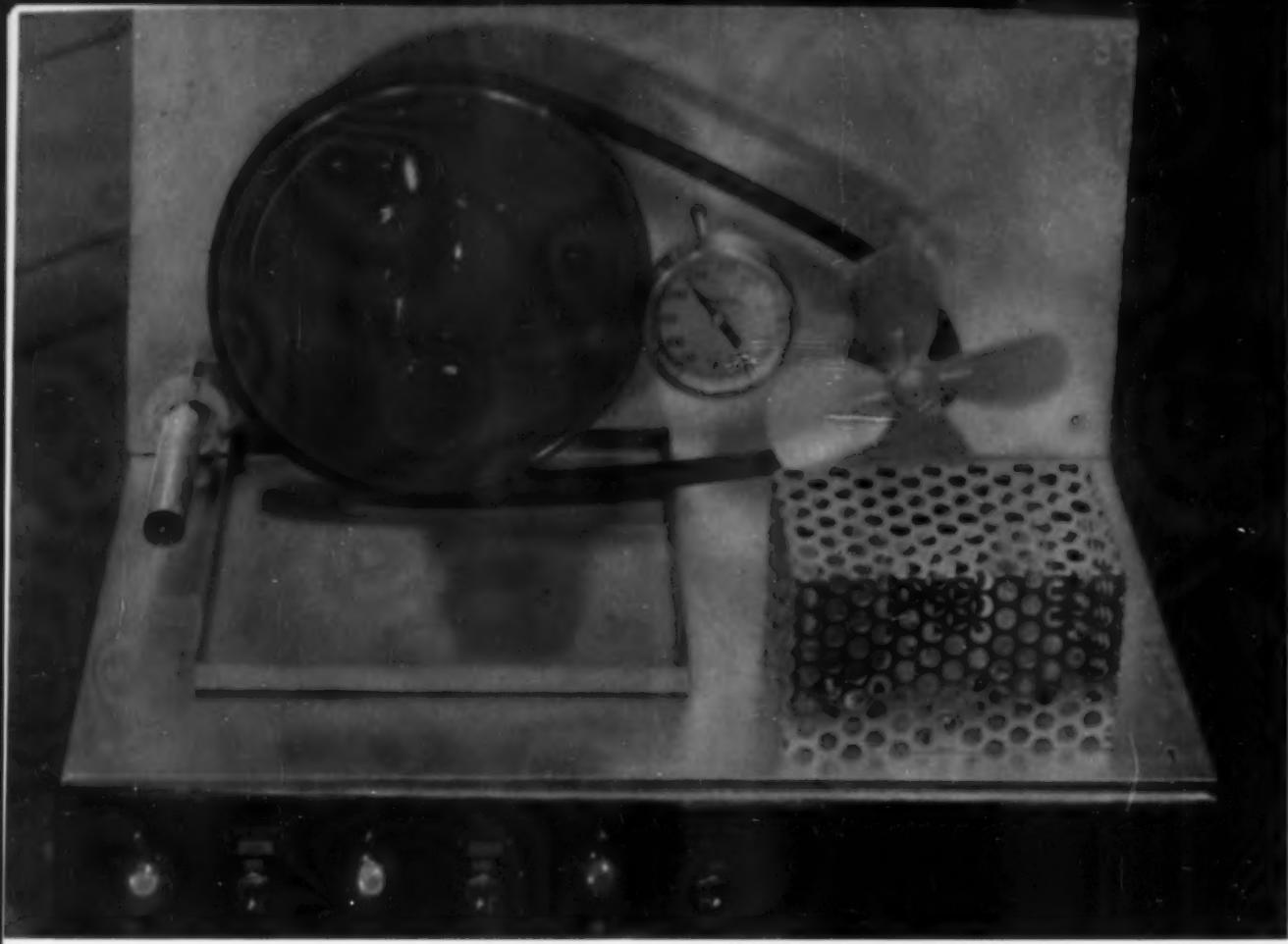
*Trademark of and patented by The M. W. Kellogg Company

NEW GULFCROWN GREASE



... the improved lithium base
multi-purpose grease





NEW

GULFCROWN

**...the one grease that
does the work of many**

- Simplifies application and avoids errors
- Reduces inventory • Cuts lubrication costs

This bearing packed with Gulfcrown Grease was run at 750 rpm in a special oven heated to 250°F. Gulfcrown "stays put" . . . doesn't run out even after thousands of hours at high operating temperatures. And the bearing remains in brand-new condition.



Samples of Gulfcrown (shown on 4 steel plates) are sprayed with water heated to 130°F. Note how Gulfcrown adheres, doesn't wash away.



Excellent oxidation stability

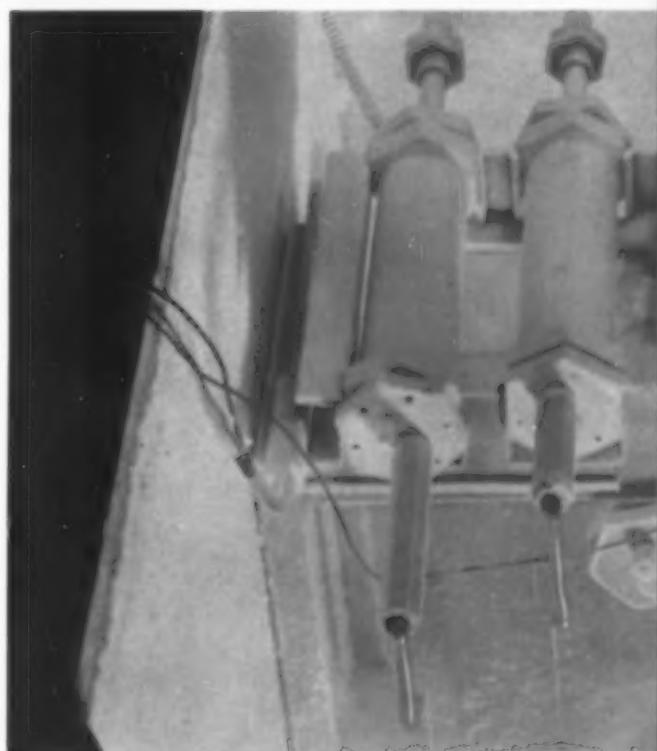
Gulfcrown is effectively inhibited against oxidation to insure long life, both in storage and in use.

Unsurpassed working stability

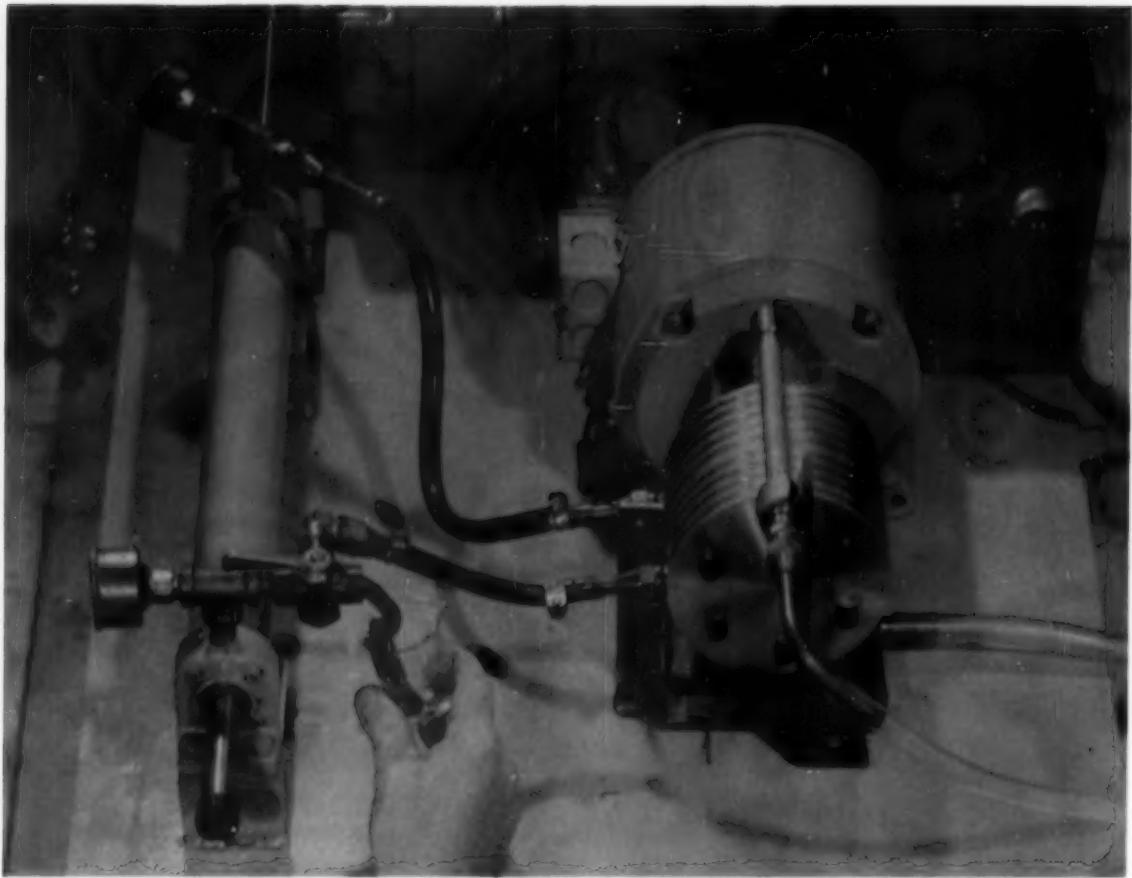
Gulfcrown Grease stands up under the churning action of high-speed bearings even at high temperatures. This means less grease consumption, less frequent applications. It is ideal for centralized grease systems—it pumps easily and will not separate.

Resists water

Gulfcrown Grease is highly resistant to the washing action of water. It provides excellent lubrication and protects against rusting even under the dampest conditions.



Gulfcrown Grease pumps easily even in coldest weather. Temperature in this freezer chest is 0°F.



This grease stability testing machine, developed at the Gulf Research Laboratory, provides additional evidence of the mechanical stability of Gulfcrown Grease. Gulfcrown does not break down in consistency even after being pumped through a bearing operating at 1725 rpm.

Gulfcrown is available in 4 consistencies. Your Gulf Sales Engineer will gladly help you make proper selection. Call him at your nearest Gulf office . . . or use the coupon below.

GULF OIL CORPORATION
1822 Gulf Building, Pittsburgh 30, Pa.

Gentlemen:

- Please send me free literature on new Gulfcrown.
- Please have a Gulf Sales Engineer call on me.

Name _____

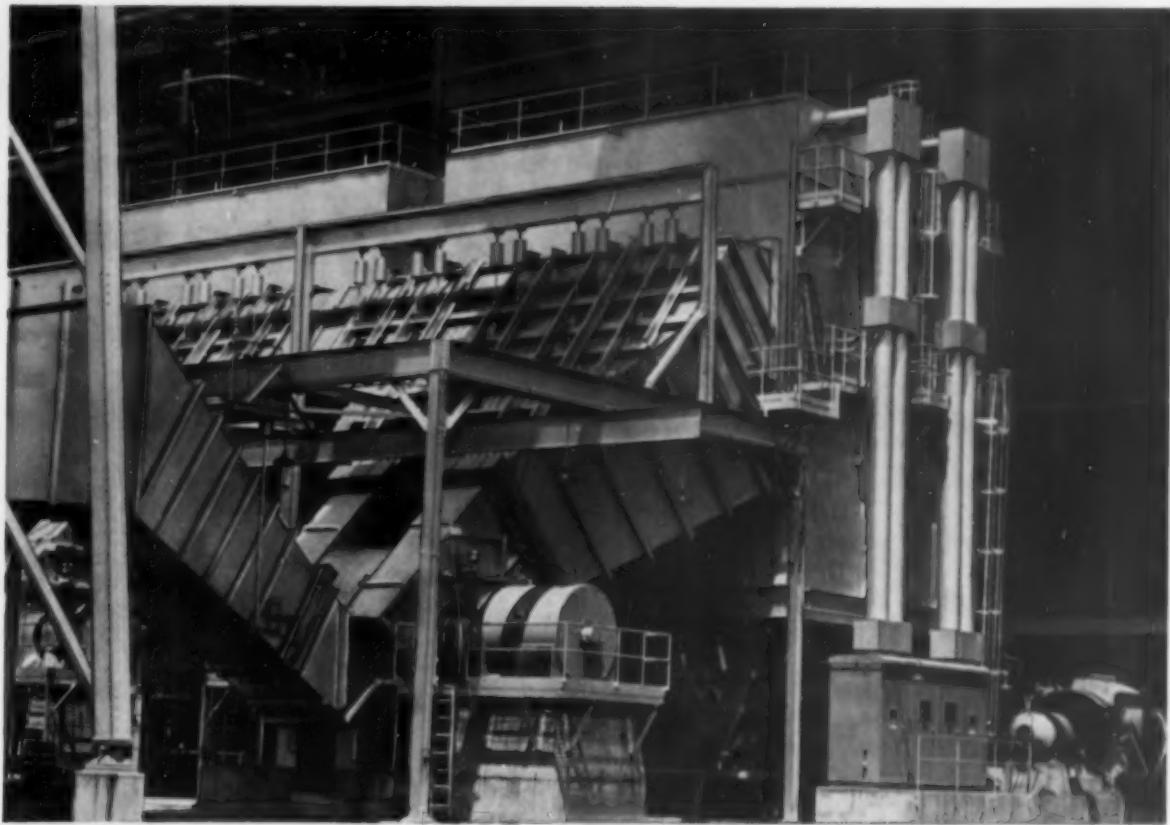
Company _____

Title _____

Street _____

City _____ Zone _____ State _____





For this Midwest power station, Westinghouse induced draft (center) and forced draft (right) fans move a total of 92,300,000 cubic feet of air and gas every hour, every day.

8 All-Weather Westinghouse Fans Supply Mechanical Draft to Meramec Station of Union Electric

Air-cooled bearings, welded steel construction resist elements

Eight Westinghouse Turbovane mechanical draft fans with vane control supply draft to the two boilers of the Meramec Station of Union Electric Company located in St. Louis, Mo. Installed outdoors where they are exposed to the varying elements, these fans perform their part of a vital power-generating job with only routine maintenance.

Four of these fans are Turbovane forced-draft type arranged double width, double inlet. The other four are

Turbovane induced-draft fans with radial-tipped blades and erosion-resistant wheels. Vane control on all fans allows instantaneous regulation of air volumes to meet changing steam demands.

For power generation—or for any other air handling job—check on Westinghouse-Sturtevant apparatus today. Let the industry's most complete air handling line *put air to work* for you—efficiently, economically. Call the Westinghouse-Sturtevant specialists located in your area or write: Westinghouse Electric Corporation, Sturtevant Division, Hyde Park, Boston 36, Mass.

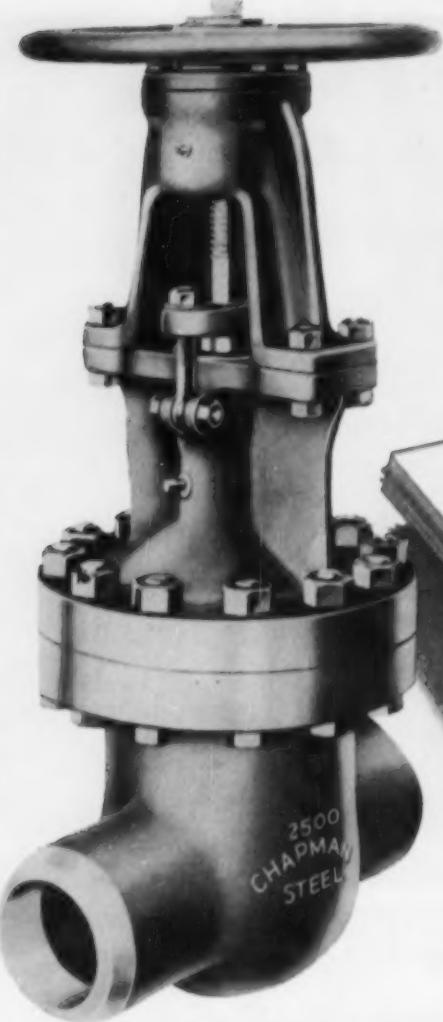


Located at the heart of power generation at Meramec, four Westinghouse forced draft fans supply 150,000 cfm each, at 11.3 inches water gauge while operating at 1180 rpm. These are teamed with four Westinghouse induced draft fans handling 235,500 cfm each, at 277°F and 17.1 inches water gauge while operating at 700 rpm.

WESTINGHOUSE AIR HANDLING

— YOU CAN BE SURE ... IF IT'S Westinghouse —

J-60417



**RIGHT,
in every case**



CHAPMAN STEEL VALVES

Check them off, one by one. They're all important to you, a user of valves . . . steel valves. You want close tolerances; tight and positive seats; smooth, dependable, operation without jamming, chattering or excessive wear. Even with long service under the most severe conditions you want to cut your maintenance costs to a new rock bottom low.

Name your metal. You can have Chapman Steel Valves in standard alloys for normal requirements . . . or special alloys for extra service conditions. And for your benefit, all of these alloys are poured in Chapman's own foundries under rigid technical supervision.

Chapman superior steel valves — gates, globes, checks — are available for all pressure and temperature ranges. You can order them with bolted, welded or pressure seal body and bonnet joints and with flanged or welding ends. They all equal or exceed ASA and API standards in every range.

Why not write now for our complete descriptive catalog No. 20.

**THE
CHAPMAN
VALVE MANUFACTURING CO.
INDIAN ORCHARD, MASS.**

TIMELY COMMENTS



Gas Turbines . . .

IN COMMERCIAL OPERATION only seven years, gas turbines have already set milestones in industrial progress. General Electric's gas turbine department recently reported on the rapid increase in the number of turbines placed in service and expanding usage in new and different applications. New applications using gas turbines have increased 50% over the number placed in service in 1955.

Newest industrial usage in 1956 was its installation in a rubber factory where the turbine provided both electric power and exhaust heat for a recovery boiler to produce process steam for the plant.

G-E recently shipped to Monterrey, Mexico, two 16,000 kw gas turbines — the largest simple-cycle, single-shaft machines yet produced in the United States. A 21,500 kw machine is being built for installation in Caracas, Venezuela.

In Orlando, Florida, two gas turbines with a combined capacity of 33,000 kw are expected to be placed in operation to make up the largest known usage of gas turbines for peak power generation in this country.

In Cordele, Georgia, engineering has been completed on the country's first power plant using a combined gas turbine-steam turbine generator. Exhaust from a gas turbine will flow into a steam boiler where, in combination with pulverized coal, it will produce steam for a steam turbine. The Crisp County Power Commission is constructing the plant at Warwick, Georgia.

An Efficient Moron . . .

HIGH-SPEED electronic data-processing machines can handle figures at such amazing speeds that a company's top executives can have decision influencing information at hand within a day or two which previously would have taken weeks or even months to obtain, if obtainable at all.

But, the electronic machine is not really a "brain" — it has been aptly described as "an unusually efficient moron." It can do its chores fast, but it has to be told every smallest detail

of what to do. And having done the job, the machine is at a loss. It can't put its own results to use. Business will continue to need people, in increasing numbers, no matter what the science-fiction writers say.

The editors of the Bureau of Business Practice remind us that fifty years ago, that astonishing new invention, the typewriter, was found in very few offices. Half a century ago, adding machines were almost unknown. Desk calculators and accounting machines hadn't been invented yet. Now all this equipment is basic to any but the smallest offices. Yet never have so many people been employed in the country's offices as there are today.

As more and more office machinery was introduced, more and more people found jobs in offices. Just like the new electronic equipment, these office machines were installed, not to cut down the need for people, but because there was no other way of getting the job done except by machine.

It is still impossible to get all the paper work done by people. There aren't enough of them, and the gap between the work to be done and the people available to do it is increasing every day.

We Are Do-ers . . .

WE LIKE TO BE a part of things and to know what's going on. At home we take great pride in an ability to "do-it-yourself."

At the office and in the plant, we're no different. We like to be part of things, to know what's going on. But hundreds of companies give their employees good pay and working conditions . . . and fail to tell them the facts about the operation of the business — their own, in particular.

Efforts to improve labor relations and increase operating efficiency should be based on face-to-face meetings between management and employees. And employee meetings can be very successful. A new 24-page publication, "Better Business Relations Through Employee Meetings," available for 50 cents a copy from the Chamber of Commerce of the United States, 1615 H St., N.W., Washington 6, D.C., is a "how-to-do-it" manual.



BORDEN MANUFACTURES EVERY TYPE FLOOR GRATING

IN FERROUS AND NON-FERROUS METALS

- **EASY TO INSTALL** — engineered in conveniently sized units for easy installation.
- **EXTRA STRONG** — reinforced, designed with maximum safety factor.
- **LIGHT WEIGHT** — approximately 80% open, reduces dead weight, allows greater live load.
- **SELF-CLEANING** — creates greater safety, economy of maintenance, no sweeping or washing required.

BORDEN METAL PRODUCTS CO.	
Gentlemen:	
Please send me BORDEN Catalog	
NAME
TITLE
COMPANY NAME
ST. AND NO.
CITY AND STATE

See our Catalog in *Sweets*

Write for complete
information on BORDEN
All/Weld, Pressure Locked, and Riveted Floor
Gratings in this FREE 8-page catalog

BORDEN METAL PRODUCTS CO.

SOUTHERN PLANT—LEEDS, ALA. — MAIN PLANT—UNION, N. J.
853 GREEN LANE Elizabeth 2-6410 ELIZABETH, N. J.

INDUSTRY SPEAKS

SOUTHERN POWER
AND INDUSTRY

"Three-Dimensional" Engineers

WE ALL NEED engineers, like grass needs rain.

We need "three-dimensional" engineers and business can do much to help develop them. At the recent Winter General Meeting of the A.I.E.E., **Frederick Kappel**, president of the **American Telephone and Telegraph Company** commented on how he thinks industry and business can "make it rain."

"We won't do it by just tagging or labeling people as engineers. We won't do it by putting engineers into compartments and shutting them off from the rest of the ship. We won't do it by cramming size 42 men into size 36 jobs, or vice versa. We won't do it by setting so-called minimum standards and then sitting back and letting nature take its course.

"We will do it I believe through intelligent and concerted effort to develop what I call three-dimensional engineers.

"**The first dimension** we'll say is what you got in college, that showed you how to move in a straight line in your first particular field.

"**The second dimension** is in continued training and self-study, that broadens a man — or a woman — and keeps him up-to-date with technological changes so he can solve problems in broad areas and new areas of engineering.

"**The third dimension** is the height that comes from the mixing and mingling of engineering and management ideas, so that the engineer's understanding of the problems and requirements of the business makes him more effective in the business.

"This understanding comes not only from study but from shoulder-to-shoulder association and contact and interaction between engineering, operating, financial and merchandising people. And we need this third dimension not here and there among engineers but everywhere — so they will have a volume effect on

the business. If engineering is to be solid, it's got to have this volume.

"**Industry can contribute much**, especially to the second and third dimensions. Right now in our business, because of the effort we're making in these directions, we're getting a wonderful amount of fine engineering work done that otherwise could never have been done so soon or so well. More than that, with a wider appreciation by other people in management of the engineer's contribution, I'm confident we're getting a better team and a better overall job. And I am equally confident that our engineers are profiting in prestige, promotion, and salary rewards as a result.

"As the need for technology increases further — and it surely will — it seems to me inevitable that the **need for engineers in management** including top management will likewise continue to increase. I don't see how it can be otherwise. What this means is simply that engineers must grow, and of course it is they themselves who must do the growing. No one else can do it for them. The training and education I've been talking about are essential, all right, but what they add up to in the end is only the soil to grow in.

"Knowing engineers as I do, and I've lived and worked with them all my life, I can only say there is no group I would sooner trust to respond to a challenge.

"The challenge to engineers today is that they should deliberately work to fill out all the height, all the depth, and all the breadth they can reach.

"Industry is equally challenged to give able engineers full opportunity to live and work and think and create in all three dimensions. For this is the kind of engineering influence and leadership we need, and I have great faith we shall get it, to the further advantage of our country and the world.

**Virginia engineer describes
new industrial control equipment**

Static Switching Systems

STATIC SWITCHING—a new tool especially designed for industrial control systems — is now available. The features of this new product will help solve many control system applications more easily and better than ever before.

Static switching utilizes static-magnetic and solid-state devices to accomplish control functions normally performed by contact making devices.

For many years a typical industrial control system has consisted of operator's pushbuttons, power supplies, control and interlocking relays, amplifiers, regulators, and power switches. Due to the high cost of maintaining equipment with moving parts, the trend in recent years has been towards static devices — except where performance is sacrificed.

Many successful applications using static power supplies, static amplifiers, and static regulators, with magnetic amplifiers and trans-

By C. P. BROOKS
Industry Control Department
General Electric Company
Roanoke, Virginia

sitors, have already proved themselves. Now the new static switching units bid to replace contact making control relays. These new units can be combined with static power supplies, static amplifiers, and static regulators to provide completely static control systems.

The static switching units are the decision making part of the system. They accept electrical signals from pushbuttons and other devices such as limit switches, pressure switches, etc. Using built-in intelligence to interpret these signals, the static switching units will control power amplifiers which in turn perform the desired function.

There is a fundamental differ-

ence between relay control and static switching control which causes a difference in circuitry.

Relay control essentially consists of a single input to a relay coil and multiple outputs from the relay contacts. Static switching consists of multiple inputs to a so-called logic unit and a single output that may be used to control several other units.

Although the schematic circuitry approach with static switching is quite different from relays, this approach is not actually new. It is the equivalent of computer terminology and is very easy to understand.

Some simple comparisons are shown in Fig. 1. This chart shows typical contact combinations and the corresponding logic approach.

Looking at Fig. 1a, for years engineers have said if M and N are energized, the circuit is established. In computer, or static switching words it can be said that if M and

Advantages of static switching systems over relay control . . .

Reduced downtime — Production is increased and downtime is reduced. The moving parts of conventional relays are subject to mechanical failure; however, it is believed that the life of a static switching unit is not a function of the number of operations because there are no moving parts. Static switching units will give years of dependable operation.

Easy maintenance — Not only is less maintenance required, but ease of maintenance is provided by the built-in stab-on bus feature and quick-connect terminals. The monitor light provides an easy visual means of circuit checking, making fast, dependable replacement possible.

Reduced inspection and replacement — Planned inspection time is reduced. Contact inspection and replacement necessary with relay systems is eliminated. Since static switching units have no moving parts, inspection is seldom required and replacement is reduced to a minimum.

Minimizes atmospheric problems — Atmospheric con-

ditions are minimized because the units are molded of a lightweight, durable compound. The solid molded units are less sensitive to vibration or other external disturbances; such as dirt, dust, oil, acids, alkalies and most solvents.

Greater reliability — Greater system reliability is assured with the use of static switching components. The long life of the basic components has been proved by wide industry usage.

Greater flexibility — Greater flexibility is provided to meet changing and expanding system requirements. The functions provided by a multi-function unit are easily changed. Additions and reconnections are easier to make with the stab-on bus feature and quick-connect terminals.

Simplified automation circuits — Complex circuitry becomes more practical. Automated and highly repetitive circuits are simpler and more reliable. Some control systems may even require less floor space than with conventional relays.

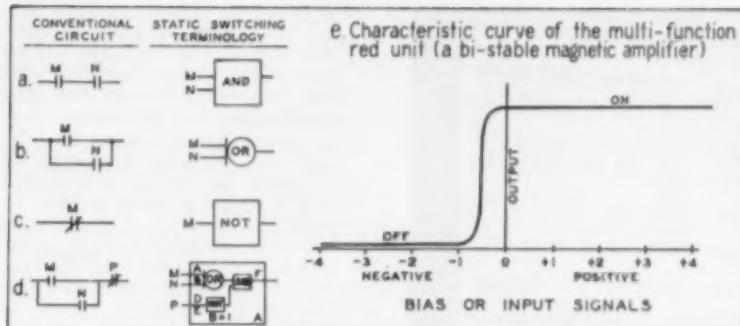


Fig. 1. Some simple schematic comparisons of conventional relay circuits with static switching.

N inputs are present, the logic unit has an output.

For Fig. 1b, if M or N is energized, the circuit is established. In static switching words, if either M or N input is present, the unit has an output.

For Fig. 1c, if M is not energized, the circuit is established. In logic terminology, if M input is not present, the unit has an output.

It is obvious that although static switching circuitry is different, the logic language is amazingly similar to existing nomenclature. The basic *and-or-not* terminology is still used.

There are different manufacturers of logic units today that offer essentially single-function units; such as *and*, *or*, *not*, etc., as shown in Fig. 1a, b, c. However the logic units described here are unique. These static switching system units were designed by an industrial control systems engineer especially for use in the large integrated control systems, where complex interlocking is the rule rather than the exception.

To better fit the needs of complicated control systems, static switching systems offer combinations of *and*, *or*, *not*, *memory*, and other functions in multi-function units. One of the many combinations available in a multi-function unit can be seen in Fig. 1d. In relay language, it can be said that if M or N and not P are energized the circuit is established. In static switching words, if either M or N and not P inputs are present the unit has an output. Thus three logic functions have been com-

bined in one static switching system unit.

Physical Description

What does a static switching system look like? A family of eight units — all of uniform size comprise the General Electric line. Each unit is potted, is lightweight, has no moving parts or contacts, and is color coded.

Fig. 2 shows a picture of a typical unit with quick connect terminals at top for signal input and output, and at the bottom for bias setting. They are made with time proved and heavy industry accepted components. The base of all units has the standard power input terminals. This simplifies the plug-in to the common power bus. Five of the units have a built-in monitor light.

Fig. 3 shows construction of a static switching system panel installed in a conveyor system application. The upper sections mount the amplifiers for the solenoids. The lower left panel is the power supply for the logic units. The lower right panel is the power supply for the solenoid amplifiers. The center of the photo shows the logic units.

The logic units plug into the power and bias bus and are held in place by clamps. Signal input and output connections between units are run in wiring channels. A unit may be easily removed by removing the wiring channel cover plate.

Another control has been installed in a steel mill. It is for the preset speed control of a tan-



Fig. 2. One of eight static switching units which comprise the General Electric line. All are similar in appearance, but they are color coded with reference to function.

dem cold strip mill. The control has been installed for several months and has been producing steel with very good results.

Operation Description

How does a static switching unit work? Logic switching function may be performed with any bi-stable device. That is — a device that has two conditions; it's either "on" or "off." The relay is a good example of a bi-stable device.

The static switching units are all bi-stable devices. The red multi-function unit is a bi-stable magnetic amplifier. The characteristic curve is shown in Fig. 1e. The ordinate is output voltage. The abscissa represents units of signal input strength in the positive direction to the right and units of signal input strength in the negative direction or bias to the left. With no input (or bias) there is an output — or the unit is "on."

Increasing positive units of input keep the unit "on." Increasing units of input in the negative direction turn the unit "off." This magnetic amplifier is not used as an amplifier in the ordinary sense of the word, rather the amplifier is used only to establish the bi-stable condition of "on" and "off."

Using the characteristic curve, it is interesting to see how the red multi-function unit accomplishes a few of its logic combinations as shown in Fig. 1.

a) Corresponding to relays M and N being energized to complete

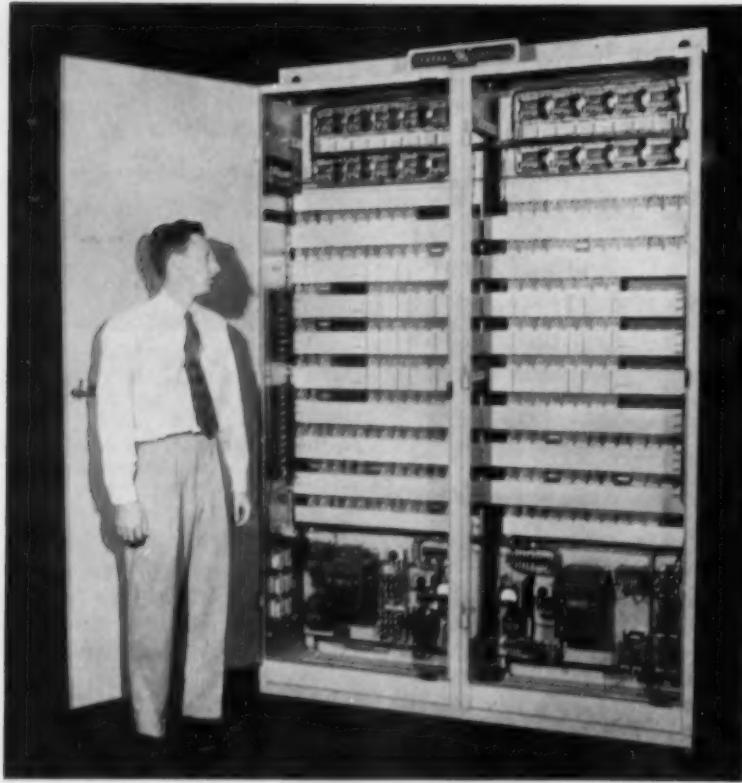


Fig. 3. Control panel installed at the Appliance Park (Louisville, Ky.) plant of General Electric in connection with the Industry Control Department's first application of its new static switching system. The panel, designed to direct the switching and memory operations of an advanced automatic conveyor system, is equipped with 195 static control elements.

the circuit, M and N inputs must be present to turn the unit "on." The bias should be set at -2 . (It is adjustable for either 0 , -1 , or -2 .) Wires M and N each should be connected to a positive input terminal.

If M input is present, one unit of positive signal will tend to turn the unit "on." If N input is present, one unit of positive signal will tend to turn the unit "on." If both M and N inputs are present, there will be two units of positive signal. Since the bias was set at negative two units, the net input will be zero, so the unit will turn "on."

If either M or N input is not present, the net input will be -1 , so the unit will be "off" as shown by the characteristic curve. If neither M nor N input is present, the net input will be -2 , so the unit will be off. Since M and N inputs must be present to turn the unit "on," the red logic unit accomplished the *and* function.

b) Corresponding to relays M or N being energized to complete the

circuit, M or N input must be present to turn the unit "on." Since only one input need be present to turn the unit "on," the bias is set for -1 unit. From the curve it can be seen that with no positive input present, the unit will be "off." As in "a," wires M and N should each be connected to a positive input terminal. If either M or N input is present the net signal will be zero, and the unit will turn "on." If both M and N inputs are present, the net signal will be $+1$, and the unit will still be "on." The unit will not turn "off" if either M or N input is present. So the *or* function has been performed.

c) Corresponding to relay M not being energized to complete the circuit, if M input is not present the unit will turn "on." Since the unit must be "on" with no input present, the bias is set at zero. From the curve it can be seen that the unit will be "on" with zero input.

This time wire M must be connected to one of the negative input terminals. With zero bias and

M input not present, the unit will be "on." With M input present, one unit of negative input will be introduced that will turn the unit "off." So the red unit has also fulfilled the *Not* function.

d) Corresponding to relays M or N and not P being energized to complete the circuit, M or N and not P inputs must be present to turn the unit "on." Since only one positive input must be present to turn the unit "on," the bias should be set at -1 unit as in "b." And as in "b," M and N wires are connected to positive input terminals.

If P input is not present, the unit will turn "on" when either M or N input is present because the net input will be zero. However if M and N inputs are present the net will be $+1$.

If P input is present, it must prevent the unit from turning "on" and should turn the unit "off" with M and N inputs present. Therefore P wire must be connected using a jumper to two negative input terminals. This is necessary because M and N inputs give a net of $+1$ and the net must be -1 to turn the unit "off."

Thus, it can be seen that one multi-function unit can perform three functions — *OR-AND-NOT*.

Fig. 4 shows what is in the red multi-function unit. This is the basic static switching circuit. The other units have modifications thereof.

The red unit has a magnetic amplifier with five windings. The output is rectified d-c. The main windings are connected to a transformer with a midpoint connection. The "on" winding is wound in the direction to turn the unit on. The "off" winding acts to turn the unit off. The bias winding acts in the same direction as the off winding and can be adjusted for 0 , 1 , or 2 units of strength.

The signal input terminals and output terminal can be seen in the circuit. The monitor light is shown connected across the output. When the unit is "on" the light is on, and when the unit is "off" the light is off. Note that one side of the input and output windings are common.

The bias terminals of all units in a system are connected in series. So if any unit loses its bias, all units will turn off — thus providing a "fail safe" feature. Since the inputs and output of all units are rectified 6 volt d-c from the same power source, there are no phasing

problems. Only a standard voltmeter is required for checking out a system.

Fig. 5 shows the known variety of circuit combinations possible with the red multi-function unit.

Eight static switching system units are made by General Electric.

a) The Red has been discussed in detail.

b) The Blue unit is also a multi-function unit that operates similarly to the red unit. It has one additional positive input and one less negative input terminal. This unit performs additional logic functions.

c) The Black unit is used for timing. By means of capacitors, externally connected, the time of 10 seconds or more can be realized.

d) The Green unit is also used for timing. A short time of 0.4 seconds can be obtained simply by shorting across the off winding.

The four units described above use magnetic amplifiers and have the monitor light. Temporary or permanent memory can be a feature of these units, and the green unit can have a permanent memory timing feature.

e) The Brown unit provides the "OR" function. It consists of two electrically isolated groups of four germanium rectifiers. Its use is for miscellaneous circuitry to combine input signals to the multi-function units. An example of this is the grouping of overloads or fault-finding circuits.

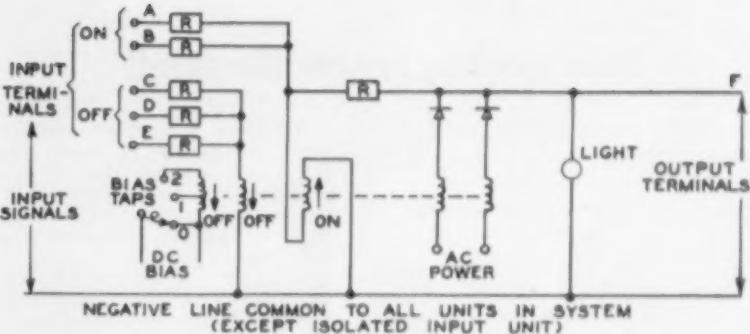


Fig. 4. Schematic diagram of (red) multi-function unit.

f) The Yellow "AND" unit is the same as the brown except that signals are combined to give the "AND" function.

g) The Grey unit serves the unique function of an isolation switch. It is used in regulating circuits to interrupt or establish a circuit. This provides the necessary isolation between the control and regulating circuit. This function is accomplished with a transformer, rectifier and transistor — all within the unit.

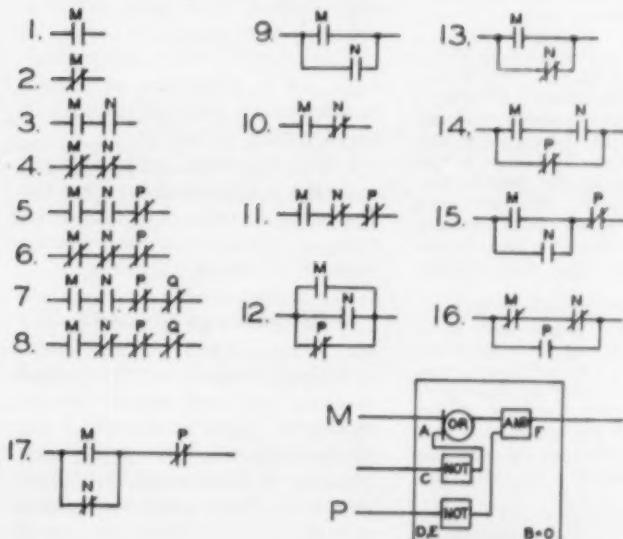
h) The latest addition to the family of static switching units is different from the other units because it has an isolated input. It is also a magnetic amplifier and has the monitor light. It will primarily be used to obtain inputs for static switching from other buses that cannot be tied to the static switching power supply. A voltage relay type of signal from an armature circuit would be an example.

This discussion describes what the family of eight static switching units looks like and how the units work. The practice on elementary or schematic diagrams will change. The logic unit symbols as shown before for AND-OR-NOT will appear instead of conventional relay coils and contacts. The diagram will show the value of the bias setting and catalog group number for each static switching system unit. Even though it is different, logic terminology can be mastered with little practice.

Applications

The benefits of static switching make it a valuable new tool for industrial control systems. However in most cases static switching costs more than conventional relay control. Static switching is not

Fig. 5. Circuit combinations possible with (red) multi-function unit. Fig. 6 (right) Family of switching units.



GROUP	COLOR	FUNCTION
A	RED	MULTI-FUNCTION PERFORMS MANY BASIC CONTROL FUNCTIONS
B	BLUE	MULTI-FUNCTION PERFORMS OTHER BASIC CONTROL FUNCTIONS
C	BLACK	LONG TIME DELAY ADJUSTABLE TO 10 OR MORE SECONDS
D	GREEN	SHORT TIME DELAY ADJUSTABLE TO 0.4 SECONDS
E	BROWN	"OR" SIMULATES CONTACTS IN PARALLEL
F	GRAY	ISOLATION SWITCH PROVIDES CIRCUIT ISOLATION
G	YELLOW	"AND" SIMULATES CONTACTS IN SERIES
H	PURPLE	ISOLATED INPUT TO OBTAIN SIGNALS FROM ISOLATED BUSSES - VOLTAGE RELAY FUNCTION

Static Switching Systems (Continued)

intended to be a complete replacement of control relays. In the past, control relays have done an excellent job in many applications, and they will continue to do so in the future.

Static switching may be completely unjustified in a single-machine application where reduced maintenance and increased reliability over conventional control are not particularly significant. On the other hand, there will be applications where the failure of control could shut down an entire production line very quickly, and therefore, it would be extremely valuable to have static switching.

Decisions concerning good and poor applications of static switching require with experience and evaluation of the particular applications. Static switching systems will be properly applied when their previously discussed benefits are most valuable.

Static switching systems will be best applied when combinations of the following exist: Frequent device operation, control system reliability, complex control systems, and bad atmospheric conditions.

Frequent device operation — In applications where a million device operations are accumulated in a few months, conventional relays quickly exceed their maintenance-free life. Static switching systems are natural for these applications.

Some examples are transfer machines, planers, and blooming and slabbing mills.

Signals must cause rolls, tables, etc., to reverse direction as often as once every second. Maintenance time and lost production due to relay failure caused by its frequent operations are very expensive. It is believed that the life of static switching units is independent of the number of operations. Here static switching should be very valuable.

Control System Reliability — In processes where downtime is costly because of lack of production or because restarting the process is complicated, high reliability is essential. Examples are tandem hot and cold strip mills, continuous steel strip processing lines such as annealing, galvanizing, and tinning, and paper machines.

Downtime means lost production that cannot be made up. Other processes may have to run at reduced capacity because of lack of steel. Annealing, galvanizing, and tinning lines must also run continuously.

Not only is continuous production required in these continuous processing lines, but restarting is tedious and time consuming. High reliability against possible downtime is provided with static switching.

A milling and drilling machine for automobile transmission cases is an example of a complex machine tool where control system reliability may be significant. Machine consists of several sections where many operations are performed automatically in a programmed sequence — casting is rough and finish milled. Locating holes are drilled. The piece is automatically rotated, positioned, clamped, unclamped, and transferred. Final operation consists of boring and tapping with the finishing machine. Control system reliability will be improved with static switching.

Complex control systems — Advances in automation increase the complexity of control systems. Complex sequences, programming controls, and the completely automatic systems have become more and more difficult to accomplish with conventional relays. Maintenance and trouble shooting complex relay systems have limited the amount of automation that is practical.

Some examples of complex systems are programming control, transfer machines, and complex conveyor systems.

A complex conveyor control using static switching has been placed in operation. This is an excellent application of static switching. This system involves a conveyor that delivers the six products of three buildings to the shipping areas in the warehouse. In the warehouse the conveyor divides into nine spurs leading directly to the rail and truck shipping platforms and storage area.

The programming and other functions necessary would have been extremely difficult to accomplish with conventional control. It was absolutely necessary to have permanent memory so that if the power switch was pulled on Friday, the sequence would continue when the switch was closed on Monday.

Extreme reliability and reduced maintenance were required in

spite of the complex circuits. The static switching system provided all these features, and in addition the monitor light provided a means of flow indication.

Static switching opens up new fields and makes possible further advancement of automatic processes that have previously been limited by conventional relays. In fact, on some applications involving highly complex circuitry static switching not only will accomplish the job better and more simply, but may even do so at less cost.

Bad atmospheric conditions — Where moist, corrosive, or electrically conductive atmospheres are present, considerable expense is often incurred in providing a source of clean air and making enclosures suitable for retaining positive pressures.

Some of the industries that have these conditions are cement, fertilizer, mining and steel. The molded static units used with static switching are less affected by these atmospheric conditions. They are ideal for these applications.

Static switching is now being applied to the control of a paper mill digester. The digester involves a temperature and chemical process of breaking down wood chips into pulp. Control is essentially for solenoid valves that transfer the wood chips, chemicals, steam, and other ingredients for mixing in the various tanks.

Summary

Static switching units are a new tool for industrial control systems. Static switching can provide several functions such as AND-OR-NOT in one multi-function logic unit. Made with durable, industry proved components, they can be combined with static power supplies, static amplifiers and static regulators to provide completely static control systems.

Static switching units are not intended to completely replace the conventional relay, but should be used on applications where their benefits are most valuable.

The static switching systems are best applied where frequent device operation, control system reliability and complex control systems are required, and where bad atmospheric conditions exist. For applications where there is a combination of these conditions, static switching systems are the natural choice.



WEATHER CONTROL for production of P. Lorillard Company cigarettes (Old Golds and Kents) has been accomplished in this huge new plant. Foamglas, a cellular glass insulation, was used in walls and roof. At right — Roofers are cutting the rigid cellular glass block with knives for fitting into the roof pattern.



Roof and Walls Important in Air Conditioning

North Carolina Cigarette Plant Covers 13 Acres

CELLULAR GLASS insulation material was used in the walls and roof of the new 13-acre cigarette plant of P. Lorillard Company at Greensboro, N. C.

The plant, with over 600,000 sq ft of floor space, is almost completely air conditioned. To protect the quality of its well known brands of cigarettes, the Company has established rigid controls on its indoor climate in certain areas. Neither temperature nor humidity can vary plus or minus 2 degrees from prescribed levels. The glass insulating material, because of its high insulating efficiency, eases the load demands on the plant's air conditioning system.

Air Conditioning Equipment

The exact climates required are maintained by means of chilled water air-conditioners; an 850-ton unit and a 350-ton fully automatic unit to meet varying load demands. The chilled water travels through underground and overhead mains to six penthouses where fans, fil-

ters, washers, pumps and time-cycle controls are located.

The conditioned air is carried from the penthouses by insulated ductwork to various parts of the plant, spilling out through diffusers. Cool air comes from the chilled-water sprays. Warm air, where needed, comes from steam coils in the air washers. Roof ventilators in some processing areas supplement the evaporative cooling system where chilled water is not provided.

Roof and Walls

Exterior walls of the plant are core-type with 2" Foamglas installed between the outer course of brick and the glazed tile interior. A $\frac{1}{4}$ " air space exists between the exterior brick and the Foamglas. The roof insulation is three inches thick over all tobacco handling areas and is reduced to two-inches over corridors, offices, and storage areas.

The roof insulation was laid in hot asphalt and topped with a

conventional four-ply built-up roof. This was covered with reflective marble chips to reflect the hot rays of the North Carolina sun. Roof decking is wood plank in all processing areas, with pre-cast re-inforced concrete elsewhere.

Material Advantages

High compressive strength of the Foamglas, over seven tons per square foot, permits traffic for penthouse equipment maintenance and for roof inspection without damage to the insulation or deck. Completely inorganic and rigid in composition, the material can neither rot nor sag. And being glass, it eliminates entry by rodents, vermin or birds.

The Lorillard plant was constructed by the H. L. Coble Construction Company, Greensboro, with Lockwood Greene Engineers, Inc., as architects. The Foamglas insulation and built-up roofing were installed by Gate City Roofing Company, Greensboro.

Built-In Dependability

MODERNIZATION wherever economically justified is standard policy with Whittier Mills Company of Chattahoochee, Georgia. A recent important improvement was replacement of old boilers with a new 16,000 lb/hr steam generating plant.

Preliminary economic studies clearly indicated that substantial savings could be realized by replacing the two manually coal fired and one stoker fired HRT boilers with a single modern, automatic, natural gas fired boiler. These savings result from a reduction in boiler operating per-

By **J. WYLLY KECK, JR.**

Consulting Engineer
Atlanta, Georgia

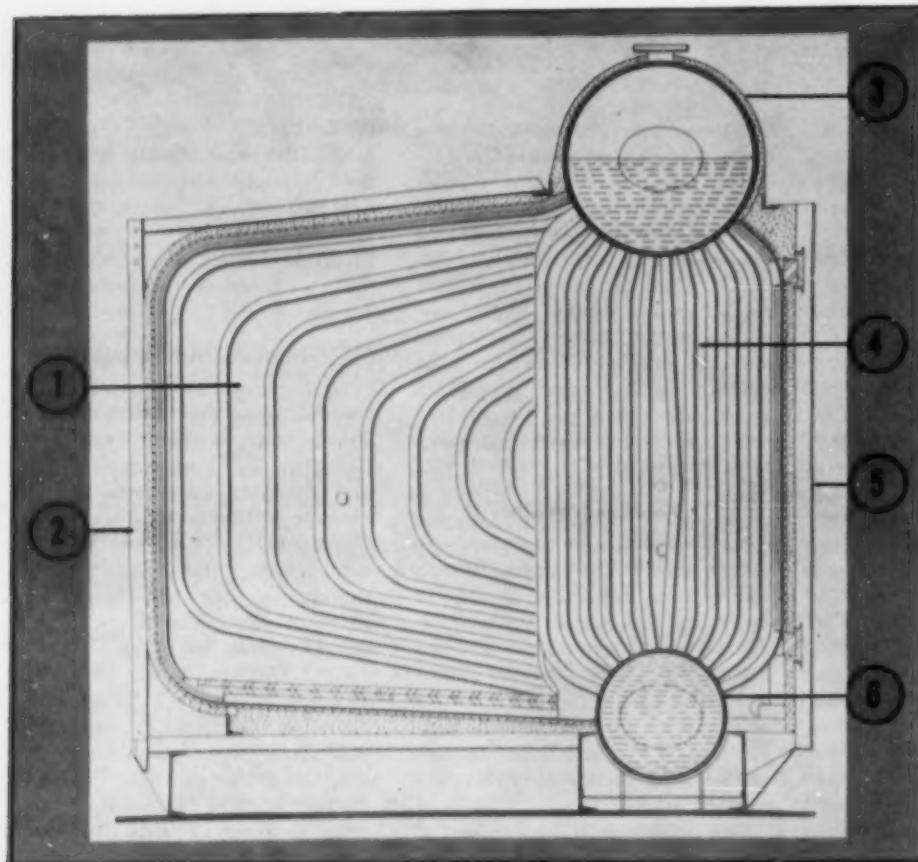
sonnel, the firing of a lower cost fuel in the plant area, and an increase in boiler efficiency realized from modern equipment. Other factors favoring the new boiler plant were simplification of equipment and controls and the use of the large existing boiler room for badly needed storage space.

Two alternatives to the new

plant as built were considered. One was the conversion of the existing boilers to gas firing which was ruled out since the existing boiler settings were in very poor condition. The combined cost of setting repairs and gas conversion equipment would then have been more than the cost of an entirely new plant.

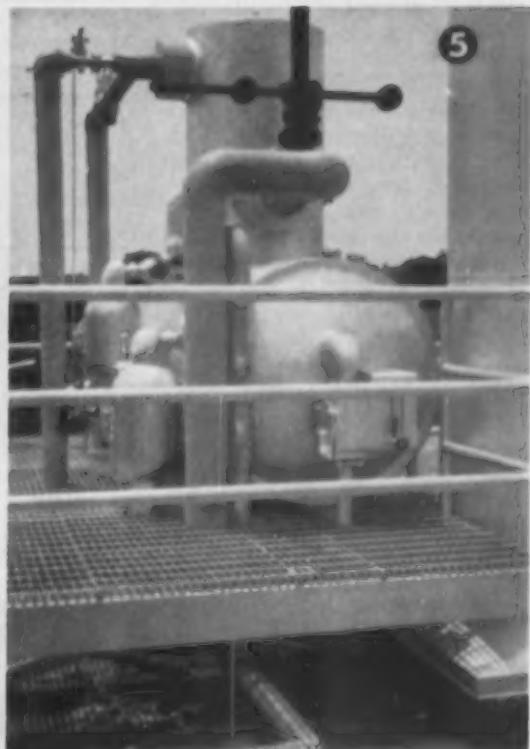
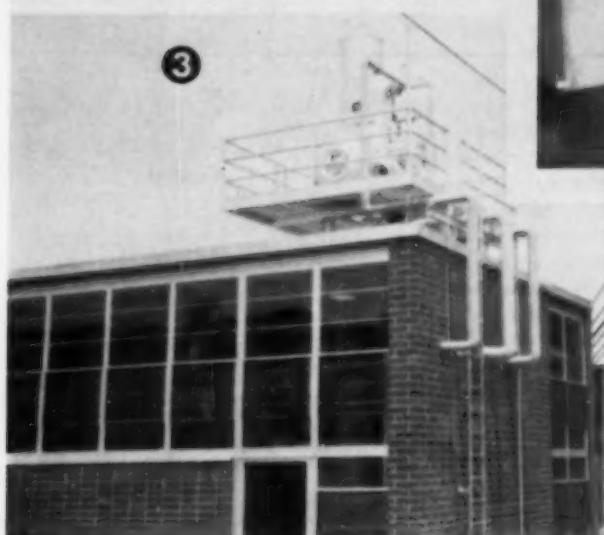
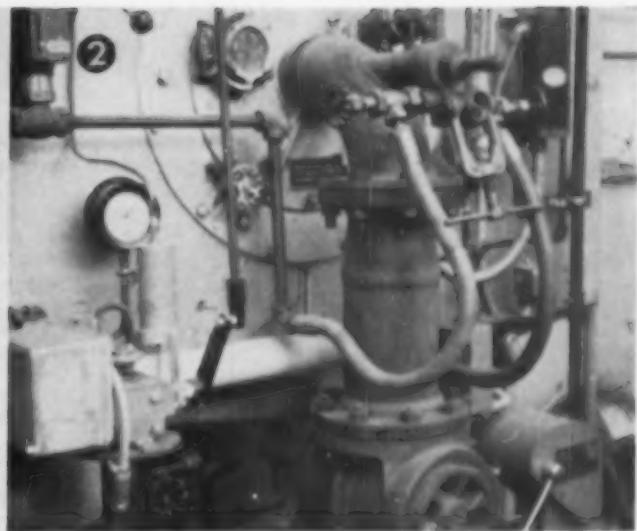
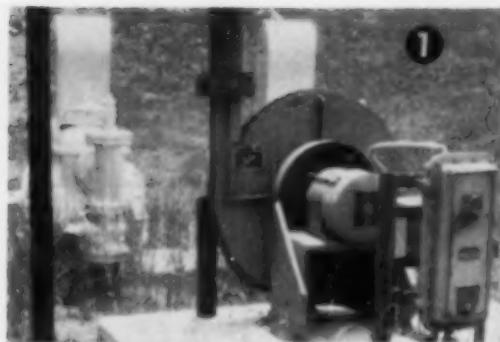
The other alternative was the installation of two half capacity boilers instead of a single unit. Obviously, all things being equal, a two boiler installation would provide a more dependable source of steam than a single installation.

The question was whether or not the greater dependability of the two boiler arrangement justified its extra expense.



BOILER SECTION

- 1—Furnace
- 2—Steel Casing
- 3—Steam Drum
- 4—Boiler Bank
- 5—Flue Gas Outlet
- 6—Water Drum



Views of steam plant at Whittier Mills. 1—Gas booster station. 2—Front of boiler. 3—Steam plant building with deaerator on roof. 4—Feed pumps. 5—Deaerator.

In analyzing the problem, importance was placed on the fact that for a small additional cost almost all likely causes of a shutdown could be eliminated by use of bypasses around control valves, provision for easy manual firing of fuels independent of all combustion controls, etc.

After designing these features into the plant, it is believed that failure of the motor driven forced draft fan and boiler tube failures are the most likely causes of a forced single boiler shutdown.

By employing regular preventive maintenance, it is believed that failure of the forced draft

fan is a relatively remote possibility. The likelihood of boiler tube failures was greatly reduced due to a well planned water control system.

Of course, the unit equipment layout is the accepted standard in the public utility field where many units and tie-lines offer flexi-

bility, but it has not been so generally accepted in the industrial field.

The new boiler plant is located away from the main mill buildings to avoid interference with future mill expansions. The plant was also located at a lower elevation than the mill to allow gravity drain of returns to the boiler room.

Boiler and Equipment

A factory assembled "D" type water tube boiler was selected. Combination natural gas with No. 2 fuel oil standby firing is used. Electric metering combustion controls were employed but were not purchased as part of the boiler package. The combustion controls are arranged for fully automatic operation on gas and manual operation on oil.

The reason for firing oil manually was that regardless of what automatic control difficulty might develop, the operator could confidently switch to oil firing and keep the boiler on the line until such time as the automatic combustion control problem could be corrected. Also, the infrequency of having to fire oil is such as to make the justification of the expense of automatic oil firing questionable.

The deaerator is located above the boiler house roof and is completely exposed to the weather, thus accomplishing a sizeable reduction in the overall height of the boiler house. Deaerator pressure is indicated on the boiler operating panel together with a deaerator low water level alarm and light.

Two full capacity motor driven two stage centrifugal boiler feed pumps are used.

Available gas pressure from the local utility is only 0.5 psig. This, coupled with the necessity of locating the boiler house over 300 yards from the gas meter, required the use of a small centrifugal gas compressor to overcome line and control equipment losses while still furnishing an adequate gas pressure at the gas burner for the wide firing range required of a single boiler installation.

External feedwater treatment is limited to the deaerator since makeup is low and boiler operat-

PRINCIPAL EQUIPMENT

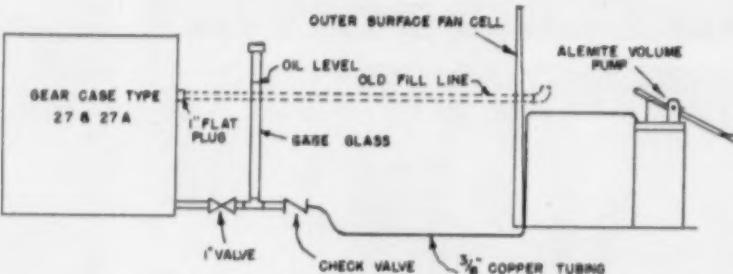
Boiler	Babcock & Wilcox Company
Combustion and Flame	
Safety Controls	The Hays Corporation (Boiler Equipment Service Co.)
Deaerator	The Swartwout Company
Feed Pumps	American-Marsh Pumps, Inc.
Chemical Pump	Milton Roy Company
Fuel Oil Pump	De Laval Steam Turbine Co.
Gas Compressor	Buffalo Forge Company
Condensate Pump	American-Marsh Pumps, Inc.
Feedwater Regulator	Copes-Vulcan Div., Blaw-Knox Co.

ing pressure is only 115 psig. Daily water analyses are made on boiler water and condensate. These tests include phosphate, sulphite, chlorides, "P" alkalinity, and hardness. More complete tests are run at about three month intervals. Sulphite, phosphate, alkalies, lignin, and amines are continuously fed directly to the steam drum by a single cylinder chemi-

cal pump. Intermittent blowdown is employed.

Results

Initial economic studies, which have been confirmed by operating experience, indicate that the entire project will pay for itself in direct fuel and labor savings, before taxes, in slightly over three years after initial operation.



Filling Cooling Tower Fan Gear Cases

THIS METHOD of filling cooling tower fan gear cases and gauging oil in the cases has proved particularly advantageous. The arrangement permits easier observation of the oil level, reduces the possibility of a false oil level in the fill line, and reduces the possibility of loss of oil and subsequent gear failure caused by breaks in the fill line. By decreasing the number of gear failures, repair cost is also reduced.

A $\frac{1}{8}$ in. copper tubing line is installed between the existing drain line on the gear case and the

outer surface of the fan cell so that oil can be injected into the gear case with an Alemite volume pump. A gauge glass is also installed on the drain line in a vertical position so that the oil level in the case can be readily seen. Previously, a 1-in. fill line running between the upper part of the gear case to the outer surface of the fan cell was used to gravity fill the gear case and determine the oil level.

By OWEN H. EDWARDS, Repairman, Katy Gas Cycling Plant, Humble Oil & Refining Co., Katy, Texas.

SILICONE INSULATION — Test Program Results

AFTER THE equivalent of 5,787 years, a much-abused motor finally broke down a few weeks ago — and one of the longest and most fundamental motor testing programs in industry was almost over. Almost, because one last motor is still running and, in theory at least, it may go on forever.

If it does, the test will never attain one of its objectives: determining the maximum life of silicone insulation in motors. Another objective, "minimum life," was settled some time ago, but "maximum" is still unknown. **High test temperatures either oxidized the copper or warped the rotor, causing motor failure while the insulation was still effective.**

The program began in October 1943 as a joint project of Dow Corning and Westinghouse Electric. In all there were eight motors: 10 hp, 1190 rpm, 3 phase induction units, fitted with special end-bells and asbestos shields to isolate the bearings. Six units were insulated with silicone bonded and impregnated materials. For comparison, two were Class B insulated.

Test Procedure

All eight motors were generator-loaded to produce average copper temperatures ranging from 200 C (392 F) to 310 C (590 F). Operating time at temperature was divided into heats, each a 25th of the motor's estimated maximum life. The heats were alternated with 24-hour conditioning periods at 100% relative humidity. An abrupt drop in wet insulation resistance — the point at which crazing appeared on the varnish surface — would be taken as "minimum life." Actual insulation failure, of course, would be "maximum life."

It was anticipated that the test would run about a year or so. Both Class B units did fail and catch fire just about as expected (see Table I), and the silicone insulated motors showed an abrupt

drop in wet insulation resistance at the predicted times as well.

Copper Oxidation

But contrary to expectations, the drop was not followed shortly by total insulation failure. Instead, the motors kept right on going. The 310-degree motor, for example, was expected to fail within a week or so. It lasted over seven months. So did one of the 300-degree motors, and the other held on for a year. When they finally did break down, it was due to copper oxidation, not to insulation failure.

Gradually it became apparent that the "failure mechanism" of silicone insulation was far different than that of organic materials. Even after the varnish had crazed it still maintained a good bond, holding the other components in place. It never evolved into a conductor, because of its silica backbone. And it stayed hydrophobic.

After some 60,173 hours at 240 C, one of the last two motors has failed. It has run the equivalent of 360 years at standard Class H hottest-spot (180 C, 356 F) temperature, or an unbelievable 5,787 years at conventional Class A (105 C, 220 F) limits.

It's doubtful, of course, that any motor could operate 5,000 years, if only for physical reasons not related to insulation. As mentioned, copper oxidation is solely responsible for all the breakdowns in the test except this last one. Here excess heat warped the rotor until it rubbed the stator, pull-



After 60,000 hours at 240 C

Motor failed because the heat-warped rotor dragged on the stator (note rub marks) pulling laminations until one pinched through a slot. Bond strength, insulation resistance and water-repellency of original silicone varnish are still good.

ing stator laminations until one finally pinched through slot and wire insulation.

As a result, the one remaining motor in the test was equipped with a new rotor. Stator insulation, however, was untouched. Chemically, that insulation is closer to glass than it is to varnish, but the motor has already run longer at 240 C than a Class A motor would be expected to run at 105 C and it's still going strong. Barring mechanical accidents or copper oxidation, there's no reason to assume that it won't keep right on going indefinitely.

TABLE I — SUMMARY OF MOTOR TEST RESULTS

Motor Number	Insulation Class	Temperature, Degree Centigrade	Minimum Life, Hours	Time to Breakdown, Hours
1	H	310	500	5,131
2	H	300	1,000	5,179
3	H	300	500	6,888
4	H	280	950	8,548
5	H	240	10,750	60,173
6	H	240	9,750	61,500*
7	B	275	20	1,056
8	B	200	200	3,760

* This motor still operating in January 1957.

**"Are you fouled-up?" asks Virginia engineer
after experience with organic contamination**

Demineralizers Decontaminated

By J. D. RISTROPH, Chief Chemist-System, Virginia Electric & Power Company

DEMINERALIZATION units have been installed in many plants to produce high quality water for many industrial uses. In the past few years much has been written in connection with the controversy, comparing relative merits of this newest purifying method with conventional evaporating equipment. We shall not attempt to support either side of the argument. There are advantages and disadvantages to each method.

This case history of an instance of organic fouling of anion resins—the cause, effect, and a solution of the problem—should be of general interest.

LOSS OF CAPACITY of the anion resins due to organic contamination in the water to be treated is one of the disadvantages of the demineralization method. The prevalence and incidence of this trouble causes the inquiry "Are you fouled-up?" to be a pertinent topic among users of water treatment equipment today.

The Chesterfield Power Station of the Virginia Electric and Power Company is located on the James River some miles below Richmond. The plant make-up and cooling water source is primarily the waters of the James River. The water treatment plant is shown in the accompanying one-line diagram.

The water is received from the river with intermittent chlorination into a flocculating and coagulation section. The effluent of the clearwell is split into three components. The greatest portion is used as bearing cooling water. A second portion is filtered through

anthrafiltr pressure filters, softened by sodium zeolite softeners, and is then evaporated for plant make-up.

The third portion is filtered through sand pressure filters, and is then passed through a multibed demineralization plant to a distilled water storage tank. This section of the treatment plant was added in conjunction with the most recent power station expansion, and thus has been in more or less continuous operation since January, 1953.

The cation unit uses IR-120 resin with an exchange capacity of 11.5 kilograins per cubic foot; the anion unit uses IRA-410 resin with an exchange capacity of 16.0 kilograins per cubic foot. The units are regenerated with sulphuric acid and sodium hydroxide, respectively. No degasification is practiced between the cation and anion sections.

The installation has a rated

capacity of 30 gpm with a total net output of 36,000 gpd based on an inlet water characteristics shown in the table.

Constituents	ppm
Calcium (Ca)	18
Magnesium (Mg)	5
Sodium & Potassium (as Na)	31
Chloride (Cl)	16
Sulphate (SO ₄)	70
Carbon Dioxide (free CO ₂)	3.3
Bicarbonate (HCO ₃)	46
Silica (SiO ₂)	12
Iron (Fe ₂ O ₃)	1.4
Aluminum (Al ₂ O ₃)	2.0
Dissolved Solids (calc.)	202
Total Hardness (CaCO ₃)	65
pH	7.0

During the late fall and early winter months of 1955, the precipitation in the James River watershed was considerably below normal. As a consequence, the flow levels of the James River were abnormally low. Because of decaying vegetation and industrial and

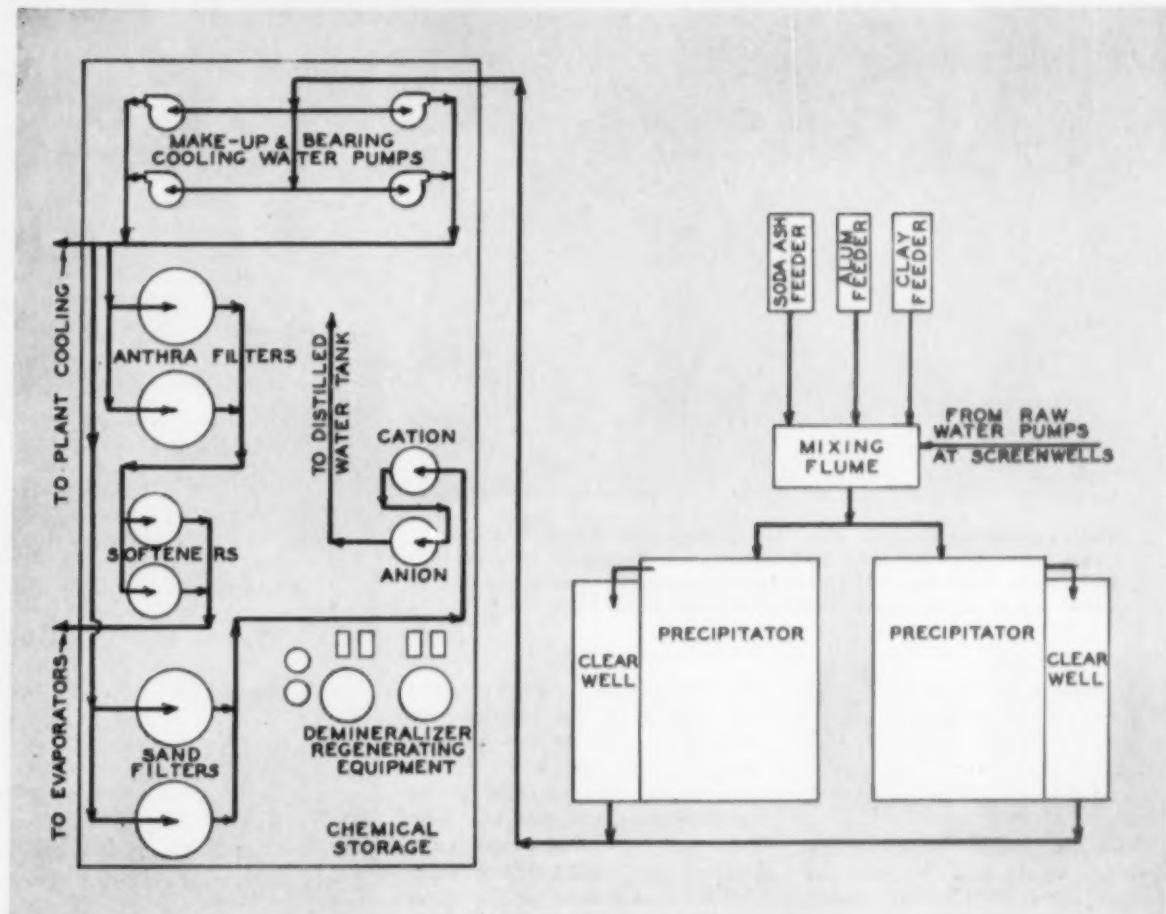


Diagram of water treatment plant

municipal wastes in conjunction with these low flows and dilution ratios, the river became heavily contaminated with organic matter.

In mid-December, a serious decrease in usable through-put and length of run was noted. Capacity decreased to approximately 40% of rating. In an effort to increase capacity, a heater was installed to increase the temperature of the caustic regenerant. A triple regeneration of the unit was made, but the output of usable water dropped to zero.

Experimental studies of the resin by the laboratory staff indicated that the resin was fouled by organic matter. The treatment of sample portions of the resin with brine solution and hypochloride solution indicated a possible rejuvenation procedure. Analyses of the river water showed the inlet water to contain nine parts per

million of organic matter.

After consideration of all factors, it was decided to attempt to rejuvenate the resin.

Filters cleaned

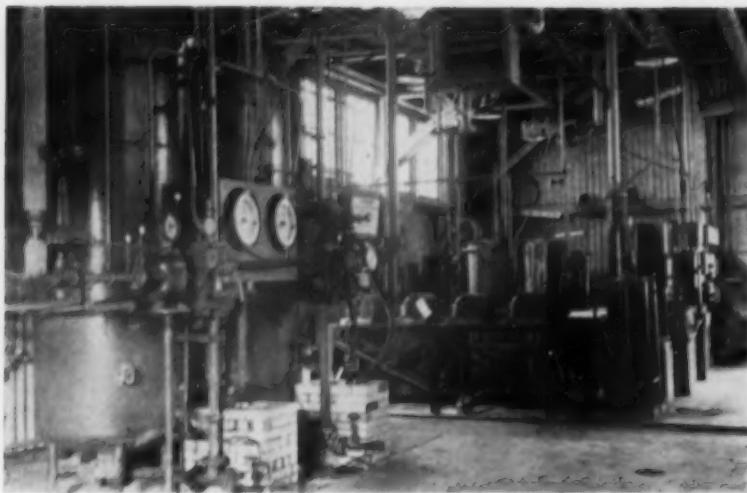
As a primary step, although no abnormal pressure drop had been noted, the sand filters were examined. Each grain of sand was found to be fully encased with a slimy material, composed chiefly of organic matter and some floc carried over from the coagulation plant.

The individual filters were treated with "Zeotone" (a commercial product whose basic composition is phosphate and algaecide), in the following manner. The filter was thoroughly backwashed at the normal rate. The manhole cover was removed, and the water level was lowered to approximately six inches above the level of the bed.

The Zeotone was added in proportions of one pound of Zeotone for each cubic foot of filter material. The whole bed was agitated by use of an air lance for 45 minutes. The manhole cover was replaced and the unit was backwashed at a normal rate for one hour. The backwash effluent was extremely turbid. The unit was then rinsed for 30 minutes, drained, and opened for inspection. This disclosed that the sand had been restored to approximately its original clean condition. The No. 2 filter was treated in the same manner with comparable results.

Anion Unit Treated

The anion unit was treated by thoroughly backwashing. The unit was then drained. A 10% solution of brine was prepared from technical grade salt. Since large quantities of reagent grade NaCl were



View showing cation and anion unit during regenerative process. Chemical pumps and tanks and regenerative equipment at right rear center. Note two different types of hydramatic control valves under test in actual operation on cation and anion units.

not available on short notice, the technical grade packaged for human consumption was used. The quantity of brine was equivalent to 5 pounds of NaCl per cubic foot of resin.

The drain valve of the anion unit was closed, and the brine was slowly pumped from the caustic tank by the caustic pump through the distribution header of the normal regeneration system. Because of poor distribution at such low flow rates, the level of the brine solution was allowed to rise until it came above the level of the resin bed; the flow of brine was stopped, and the unit drained. This process was repeated until all the brine solution was utilized. The brine effluent was colored ranging from straw to amber in color. No suspended matter was noted, but considerable foaming was encountered.

The unit was then treated with an alkaline hypochlorite solution. This solution was composed of a 1% mixture of sodium hypochlorite in a 1.5% solution of sodium hydroxide. The volume calculated as a ratio of 10 cubic feet of solution per each cubic foot of resin.

The mixture was slowly introduced at the rate that necessitated some 12 hours for total introduction of the solution. The procedure

followed in the brine treatment was used since the solution was allowed to cover the bed and was then drained. This was repeated three times; then the solution was again allowed to cover the resin bed, and the drain valve was cracked open sufficiently to maintain a balance between the input and output of the solution. It is considered important that this "flowing" condition be attained and maintained rather than a mere "soaking" process. The color of the effluent ranged from black to light amber.

The original brine treatment was then repeated, and the effluent again was highly colored. After the backwash following this second brine treatment, the anion unit was given a triple caustic regeneration. Water of satisfactory conductivity was obtained, but the

dissolved silica content was extremely high.

It might be understandable if it is noted that we were somewhat disappointed at this stage.

The unit was backwashed for five hours, a 3.5% solution of warm caustic was added and allowed to stand for five hours. Completion of the regeneration cycle gave an effluent satisfactory in all respects. As a further treatment, a solution of 3.5% caustic was reintroduced and allowed to stand overnight. The regeneration was then carried to completion.

Results

It was indicated that the resin had been completely rejuvenated in that the quantity of good quality water obtained was consistent with the calculated output based on the rated exchange capacity of the resin. The resin, which had been black in color, was restored to approximately its original amber color.

In retrospect, it is felt that completely satisfactory results could have been attained if a 3.5-4.0% caustic soak for some 8-10 hours had been utilized subsequent to the second brine treatment and heavy backwash, rather than the two-stage caustic treatment actually used.

Since the return of the unit to service, there has been a throughput of approximately 2,500,000 gallons, or 125,000 gallons per cubic foot of resin. The capacity in the period of January-August, or 8 months, has remained at approximately 100% of rated capacity.

It is apparent that there was considerable organic matter in the water source, all of which was not being removed by the coagulation and filtration process. However, it is suspected that a rather heavy "slug" of contamination was experienced at the time of our worst trouble.

Due to the many different types of resins, and the almost infinite variation in possible organic contaminants, the procedure followed above is not cited as a panacea. We can say that it enabled us to return to service at a small cost compared to replacement of the fouled resins.

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**See Service Cards
Page 89**



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An Atomic Energy Program for the South

CREATION by the Southern Governors' Conference, of a regional authority to evaluate the meaning of atomic energy for the South is an important step demonstrating a foresight unequalled in other regions of the nation. Out of this evaluation should emerge plans for an atomic energy program which will be uniquely suited to needs of the area.

Nature of the Program

The program must be concerned primarily with benefits to the region for which it is designed, and activities of other regions need to be evaluated in terms of their effects on the South. In short, a regional program must be based on regional self-interest and derive its major support from those groups which stand to profit from its benefits.

While a regional program should be sufficiently broad in scope to foster an awareness of the important facets of nuclear energy, it should also be recognized that nuclear technology cannot be a panacea for all the economic and social difficulties of any region. A miniaturization of the national Atomic Energy Commission not only would be inappropriate but would die from lack of that vital support born of self-interest.

The temptation to sponsor elaborate and spectacular schemes must be tempered by consideration of less dramatic but more essential projects. It is entirely possible that some of the associated benefits of atomic energy may have greater significance for the South than the direct benefits which are now receiving the attention of both national and international programs. Special attention must be given to some of the real problems posed by nuclear energy. A constructive program cannot be so blinded by the promised benefits that difficulties are neglected or ignored.

Specific Aims

In its initial activities a regional atomic energy program should be primarily concerned with studies of the area which it serves and with existing technical information which can be of immediate value. Later activities would include the development of new information of benefit to the region and means for the utilization of

this information for the betterment of the economic status of the region. The specific aims are tabulated.

Area Study

Not all the possible benefits of nuclear technology will present advantages peculiar to any particular region. The purpose of an area study is to determine those benefits which are important to the region. The area study should include a comprehensive study of the mineral, water and fuel resources, the nature of industrial and agricultural activity and any deficiencies in power, water supplies, and lack of diversification of industrial and agricultural activities.

Material needed for such an area study has been assembled for other purposes and should be available in the development councils of the states. Deficiencies in educational preparation to meet the needs of modern technical society and any deficiency in awareness

Aims for a regional atomic energy program should include:

1. a study of the region from economic, social and educational viewpoints to determine the possible impact of nuclear technology, necessary adjustments, and deficiencies,
2. a comprehensive study of information available from existing sources and rapid dissemination of that information believed to have special application in the region,
3. encouragement of the Atomic Energy Commission and other outside groups to develop, either on a cooperative or independent basis, information which is needed for the development of the region,
4. support and encouragement of scientific studies in institutions of higher learning and in the laboratories of the region to develop new information having special application in the area,
5. encouragement and assistance to industries associated with nuclear technology to promote their establishment in the region,
6. special consideration and assistance to native nuclear industries,
7. promotion of scientific and technical training of personnel needed for nuclear technology through the established agencies having responsibility for educational matters,
8. a study of nuclear hazards in cooperation with national agencies with a view to recommendations for legislation providing for uniform and effective controls,
9. the establishment of a regional center for nuclear science and technology at one of the state-supported institutions of higher learning, preferably where substantial facilities of this nature are already in existence,
10. assistance in the utilization of nuclear techniques which are of unique value to the agricultural and medical programs in the region.

By JOHN F. LEE

Professor of Mechanical Engineering
North Carolina State College
and SPI Consultant on Atomics



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Regional Atomic Program (Continued)

of the opportunities offered by nuclear technology for the region should receive careful attention.

Available Information

An area study will raise such questions as the feasibility of relatively low pressure and low temperature steam power plants in high-cost fuel areas where a limited supply of condenser cooling water is available. Information on atomic gas-turbine power plants which require small quantities of water can be obtained from national agencies. Information as to the economic feasibility of atomic gas-turbine power plants in capacities sufficient to meet the needs of the area apparently is not available and will have to be developed.

The area study should show any undeveloped mineral deposits which may have had no commercial value but now are essential to the nuclear industries. Information on improved mining and processing techniques may make some of these deposits worthy of economic exploitation. Technical information available from other agencies may indicate that the existence of valuable mineral deposits could not only spawn important mining and processing industries but the proximity advantage could also promote the establishment of industries utilizing the minerals.

It is common knowledge that the electronic and instrument industries are growing by leaps and bounds. A large share of the future growth will be caused by the tremendous demand for automatic controls and instrumentation for industries utilizing nuclear energy in one form or another. An area study should show how much of this industrial activity the region possesses in comparison with other regions. Available information could indicate ways and means for attracting a greater share of the electronic and instrument industry and ways in which existing industry of this nature can

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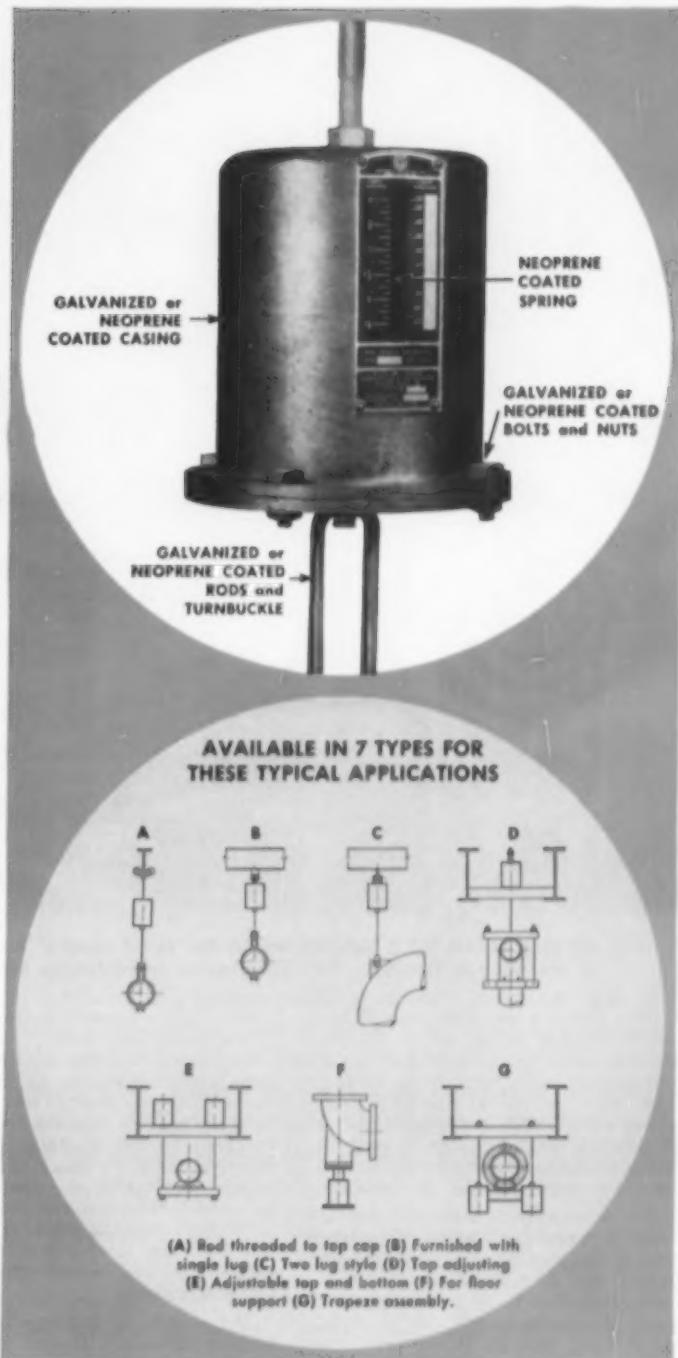
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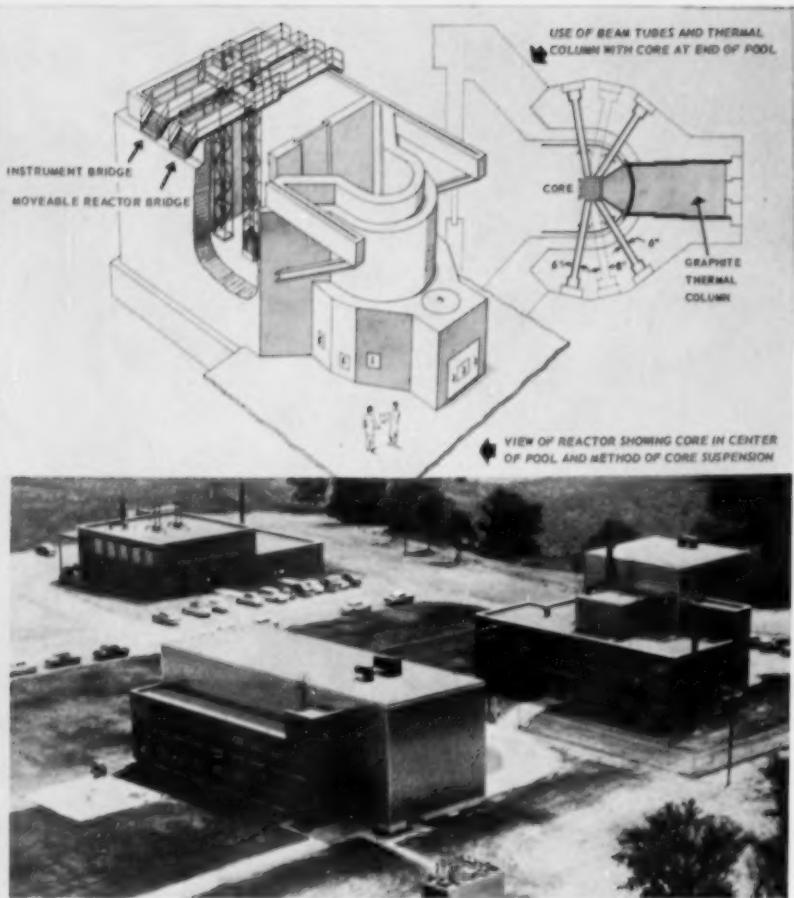
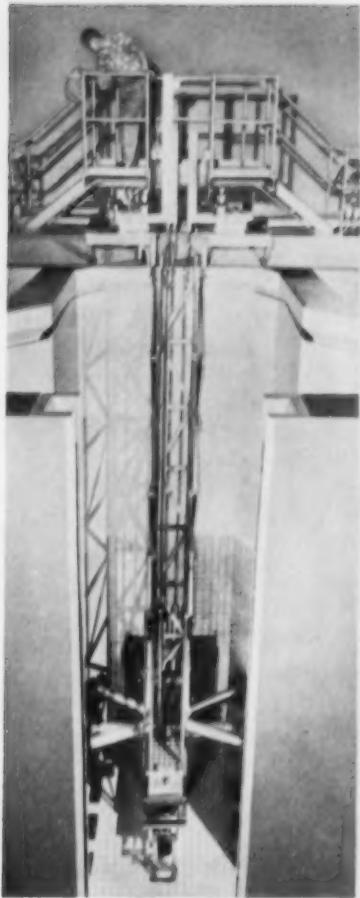
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An ideal model for a regional center. Battelle Memorial Institute placed its Nuclear Research Center in operation in October, 1956. The reactor and buildings are shown at the left.

The core of research reactor, in which nuclear fission occurs, is suspended in a pool of water by a tower attached to a movable bridge. The core consists of about 20 fuel elements, each 3-in. square and 2 ft long. A second bridge is used to bring materials close enough to the core for experimental irradiation.

For some experiments, the reactor core is moved close to the right end of the pool where special "beam tubes" and a "thermal column" contain specimens to be irradiated. The pool is approximately 20 ft wide, 40 ft long, and 28 ft deep.

continue to grow in the region.

Available information on food sterilization techniques using radio-active materials, for example, could enable peach growers and meat packers to increase their markets and realize larger profits. Failure to recognize the potential of these new techniques could result in the loss of important agri-

The core is located at the bottom of the suspension tower. When sufficient fuel elements are placed in their proper positions in the plate, nuclear fission begins and the reactor produces gamma rays and neutrons for use in research. Tubes entering from the sides of the pool terminate close to the reactor core face and have specimens inside them when the reactor is operating. Radiation from the reactor penetrates the tube walls and causes changes in the specimens.

Three units of Battelle Institute's Nuclear Research Center are locat-

ed about 15 miles from Battelle's main laboratories in Columbus, Ohio. Shown in the general view are the research reactor (foreground), critical assembly laboratory (right), and hot cell laboratory (left background).

Other units include an ore treatment and chemical engineering laboratory, reactor materials laboratory, and the radiochemical and gamma irradiation laboratories. Together, these laboratories constitute a complete facility available to American industry for nuclear research on a contract basis.

cultural income to other parts of the country or even to foreign countries.

These are only a few of the possible benefits of nuclear technology which could be made available to the region through information which is at least partially available from a number of sources.

Despite the large amount of

technical information already available there will be need for special technical information not yet in existence.

Programs, such as those on food sterilization and package gas-turbine power plants, will in time provide the required technical information. Federal agencies can be encouraged to promote investiga-

tions to develop new technical information where there is a need from a national standpoint. Even where regional self-interest alone is the motive for developing new technical information the federal agencies have already demonstrated their willingness to cooperate. This is evidenced by the favorable support of power reactor studies for regions in which power costs are high.

Certainly it would be a mistake for a region to finance independent studies when these studies can be more properly undertaken by other agencies.

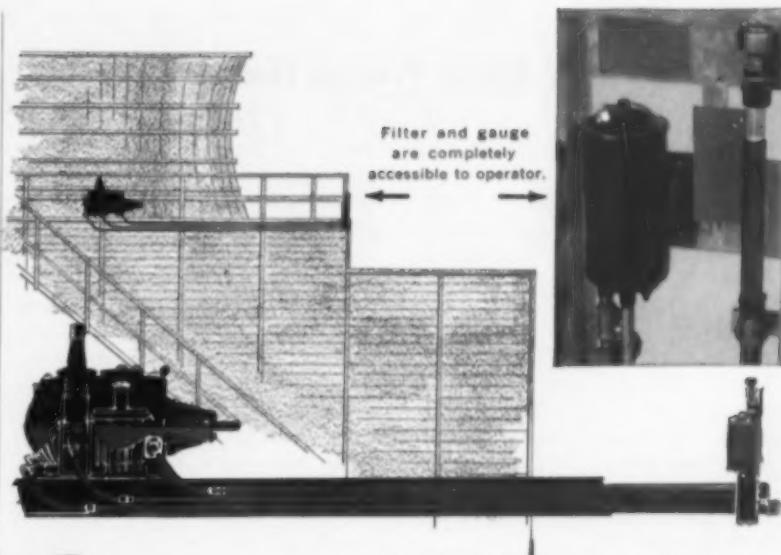
Scientific Studies

Scientific studies should be encouraged in institutions of higher learning located in the region. Basic scientific studies should be encouraged since they represent the fountainhead for the creative ideas which breathe life into the whole educational endeavor. However, basic research should receive its primary support from educational funds as a necessary part of any respectable educational program.

The problems associated with the implementation of nuclear energy in the industrial life of a region are largely in the fields of engineering and technology. Appropriate direct financial assistance should be accorded investigations bearing on the needs of the region. Such investigations could be undertaken in both public and private institutions of higher learning and commercial laboratories and institutes located in the region.

Industry Support

Most experts agree that the nuclear industry will be valued at several billion before 1965. In addition to the growth of basic nuclear industries there will be a significant parallel growth in other industries which supply the nuclear industry. For example, radioactive sources are effective as components of control, regulatory and measuring instruments and their manufacture constitutes a basic nuclear industry. Nuclear power plants will require considerably more instrumentation than conventional power plants and hence this demand will contribute to



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Regional Atomic Program (Continued)

growth in the instrument field generally.

Radiation sterilization will constitute a basic nuclear industry and will cause the development of other basic nuclear industries, such as the preparation of radioactive sources, as well as increased demands on other production facilities for packaging and the processing equipment for the sterilization plants. These represent types of industries which need to be supported and encouraged through technical information and assistance in planning.

Some areas of the South have high fuel costs. These areas can be made more attractive to industrial development through the possible development of lower cost nuclear power. The power companies in these areas should be encouraged and assisted in obtaining the required federal funds for the study of nuclear power plants best suited to their needs.

The mere existence of a constructive regional atomic energy program can serve as an attraction for basic and associated nuclear industries to locate in the region. This facet of the program should be explored and actively developed to demonstrate clear advantages to industrial location in a region aware of the potential of atomic energy.

Native Industries

The true wealth of any region can be measured in terms of native industry created by native genius and developed with native capital. After many years as a debtor region in advanced scientific and engineering education, the South is slowly beginning to emerge as a creditor region. It can be expected that the advanced graduates of our institutions of higher learning will be the people who have the scientific and engineering creativity to recognize unique opportunities for new types of industrial development.

Creative people are the core of modern industrial empires. One need only point to the phenomenal

growth of Tracerlab in Boston beginning as an idea in the minds of two graduates of Massachusetts Institute of Technology while they were still students. Not only did they create a new business but they saw an opportunity for a new industrial activity previously unheard of.

Native industrial venture should receive considerate support and even financial assistance once the basic ideas have been established as sound. A relatively small investment in money and time can produce direct and indirect returns in regional economic advancement beyond estimation.

Personnel

No region is wealthier than its human resources and an atomic energy program can be nothing more than a paper proposition without an adequate reservoir of people to carry it out. Technically trained people at all levels, ranging from advanced engineering and science to the technician level, are essential to the success of any modern industrial society. Demands of the nuclear industries for technical skill will be particularly high.

The technical institutes and the vocational training schools need all the support they can receive from all sources. An atomic energy program should provide whatever support it can accord to existing agencies, promoting educational programs. However, the atomic energy program itself should not assume primary responsibility for educational needs lest it overburden itself with too diverse a range of objectives.

Nuclear Hazards

Nuclear hazards are not thoroughly understood. There are no national standards of safety and health in nuclear matters having general application. It is true that Congress has vested certain regulatory authority in the Atomic Energy Commission but the individual states and communities will need to supplement these regula-

tions. Unreasonable and unrealistic local regulations based on misunderstanding of the facts can be the greatest single detriment to the growth of nuclear industry in a region.

It is only right that the ultimate regulatory power should rest with the states as it does in other similar matters. However, there is an obligation on the part of the states to develop a sensible pattern of regulations which are somewhat standard among the states. There is adequate precedent for cooperation on the state level in the standard highway specifications and motor vehicle regulations developed in more recent years. An atomic energy program has an important obligation to promote and support informed legislation to protect the safety and interests of the people residing in the region.

Development Center

An atomic energy program is inadequate if it does not provide sufficient research, development and experimental facilities to meet the industrial needs of the region. Other regions already have privately owned facilities for industrial use and their availability has had a pronounced effect on nuclear industrial activity. A development center is essential as a focal point for the implementation of a regional atomic energy program. Such a center should be designed for versatility and general usefulness, resisting all selfish temptations to erect spectacular local monuments of limited utility. Expense is so great and personnel is so limited that intelligent coordination of area effort will be a major dividend of wise cooperative effort.

The erection of an experimental nuclear power plant by the Regional Authority would represent the ultimate in folly since it could reveal data on only one type of power plant and could produce little valuable new information on the economic problems associated with nuclear power. Private industry and the Atomic Energy Commission have already expended such large sums in the development of various types of nuclear power plants that any regional contribution

Inside Story on POWELL VALVES for POWER PLANTS

On the outside, valves may look alike. However, on the inside there can be a big difference — in the metal itself, in design, in manufacture. And the inside story on Powell Valves for Power Plants is that every valve has **PERFORMANCE VERIFIED**.

In the manufacture of Powell Valves, only the finest available materials are used. And painstaking quality control is rigidly enforced through each and every step of manufacture. Every part of every valve must pass rigid inspection.

As a final step in manufacture, every Powell Valve is subjected to an **ACTUAL LINE TEST**. Because of Powell's quality control, valve failure is practically unknown. Records from the world over prove it.

Consult your Powell Valve distributor. If none is near you, we'll be pleased to tell you about our **COMPLETE** quality line which has **PERFORMANCE VERIFIED**.



FIG. 1561WE -- 150-Pound Steel Swing Check Valve



FIG. 2608 -- Bronze "W.S." Full Flow Globe Valve for 200 Pounds W.P.

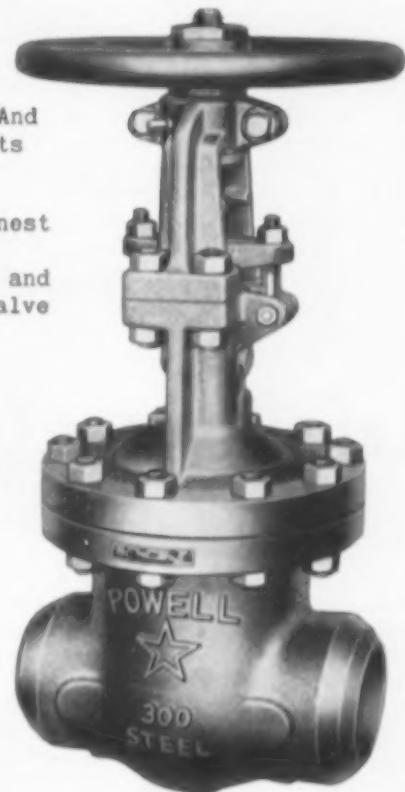


FIG. 3003WE -- Steel O.S. and Y. Gate Valve for 300 Pounds W.S.P.



The Wm. Powell Company, Cincinnati 22, Ohio . . . 111th YEAR

POWELL VALVES

BRONZE, IRON, STEEL AND CORROSION RESISTANT VALVES

Atoms (Continued)

would be a puny one indeed.

The Nuclear Research Center recently completed for the Battelle Memorial Institute at Columbus, Ohio, represents an ideal model for a regional center. The Battelle Center pictured in Figs. 1 through 6 consists of a research reactor, a hot-cell laboratory, a critical assembly laboratory, a gamma irradiation facility, a radioisotope laboratory, an ore treatment and chemical engineering laboratory and a reactor materials technology facility. If a clearing house for atomic energy information were added such a

center would meet the diverse needs of a large region.

The cost of building and operating the laboratory facilities could be largely defrayed by the industries using the facilities. If operated on a non-profit basis for regional industries the center would serve as an important inducement for industries to locate and grow in the region. Existing nuclear facilities, such as those at North Carolina State College, could be expanded and included in a regional center with a relatively small additional capital outlay.

Agriculture and Medicine

A regional research center not only would meet the needs of

industry but also agriculture. Agricultural research needed to improve present crops and to introduce new types of crops into the region is greatly dependent on irradiation and radioisotope facilities. Advances in food technology appear certain to be tied to nuclear tools as essential components.

Similarly the development and growth of a pharmaceutical industry in the region is dependent on the availability of adequate nuclear research facilities. The treatment of many human and animal diseases as well as the determination of the causes of disease have shown rapid advancement in recent years when aided by nuclear technology.

Let's Have a Conference

CONFERENCES are so prevalent that one often wonders if we haven't a "Meeting Virus" that is devouring much of the valuable time of those who could be more productive directing their respective jobs.

The superliberal management of most of our large companies have allowed a lot of productive talent to be tied up at the call of too many who should not even try to hold a conference, for they don't seem to be able to control them after they are called, and the sum total of these called conferences is compounded into many more time consuming meandering and irrelevant conversations.

Recently a company notified its stockholders of a lower earning per share for the past three months and immediately the local sales manager called a meeting, on short notice, of *all department heads* to hear him read verbatim the leaflet sent to *all department heads*.

Following this reading thereof, they were admonished to keep their eyes open to each and every possible lead that would aid sales, for as he stated, "We do not know what will happen in Asia." At this

The time you waste reading this can be recouped if you will avoid and discourage verbosity at your next meeting.

point the armchair Generals, Admirals, Economists, Columnists and others began to squirm in their chairs and there was considerable hand raising, not to be excused, but to get attention, or the floor, or both.

The sales manager continued by saying, "Now gentlemen, we know good old Comer-Boner Corporation can depend on you and, since we should all be back at our respective headquarters, we know there are many here who can contribute much to this effort so dear to our hearts so I now call on good old Jack Huffer for a few words. Jack, before I give way to you the boys must hear how we pulled that big order from Podunk, Ltd. You will die laughing at this."

So for thirty minutes more they listened to an age old story warped and twisted to fit a picture he was trying to portray in words. During this period there were several in-

terruptions to correct the time, the place, etc.

Before good old Jack had indicated there might be a conclusion to his speech, the movement of the crowd indicated the virus was spreading, and the fever was up in several bodies ready to take off on other tangents not in any way relevant to the subject of this meeting or conference.

With the help of those who were also anxious to air their views, and the Chairman, poor old Jack was growled down. About this time the Chairman was faced with the problem of which of the five or six persons on their feet should be heard. All the while the room was in an uproar with numerous loud and private conferences, and the cries of those wanting to be heard.

The sales manager-chairman, always being equal to the occasion, granted yelling space to old CBC's 40 year old veteran, a man almost

everyone likes to hear. Sometimes this trick of deferring to old age or oldtimers quiets the mob.

Then Joe Doakes, the 40 year old veteran rose slowly, commented on the wonderful company old CBC is, what they had done for employees, etc., breaking suddenly to offer economic reasons for the condition of the nation today, and particularly the foul way the Secretary of the Treasury of our country was so almighty tight on sending free TV sets to the Laplanders where his great-grandfather lived for months, trying to prove Admiral Peary did reach the North Pole. The group did quiet down some when Joe mentioned Laplanders and this sudden quiet left poor Joe almost speechless. He at last did thank them for listening and was pulled down by an old crony.

Now all were in for it. The next speaker, with careless use of the noun, was one that usually cleared any hall when he rose to expound theories on taxation, but this was a conference duly called by the sales manager and all should sit and take the punishment. A few fellows did slink out when the cooling fan started and the low voltage dimmed the lights.

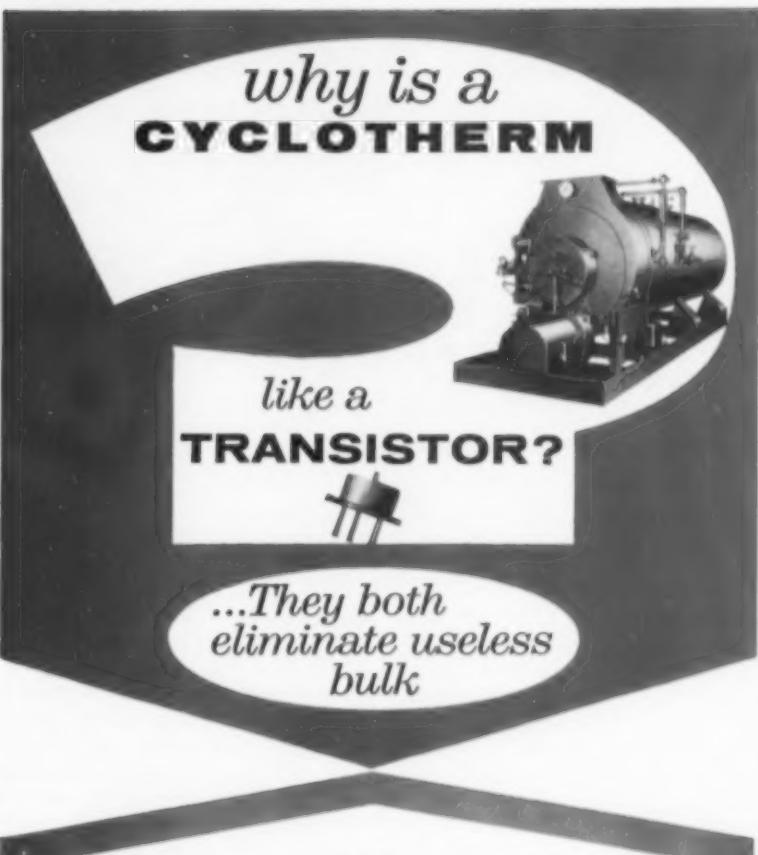
Edgar Foxhein had the floor and most of the chairs developed teeth working with considerable force on a few posteriors. Ed had figured the total taxes paid to the third point beyond the decimal. He told why tax payers were being gouged and knifed to little bits with the change of administration and could see no good in any shape, form or fashion in having an army man handle the job of leading the nation.

No one knows how Ed got off on problems of why the government should hold the line on inflation. It must have been when some dozed a few minutes. Anyway, there was a lot more that they can't and don't want to remember.

Several other would-be speakers had their say and the conference that should have taken less than fifteen minutes, or preferably should not have been called, took two and one-half hours. The hourly take of those present ran into con-

(Continued on Page 74)

*why is a
CYCLOTHERM*



COMPACT—that's the word for today's radio, with modern transistor tubes replacing the big tubes of earlier days. And Cyclotherm, too,—the modern steam and hot water generator—is a case history in the elimination of useless bulk.



Saving up to one-third the space required by the ordinary boiler, Cyclotherm's exclusive, patented Principle of Combustion and Heat Transfer gives more horsepower per unit of weight, uniform heat transfer for every square foot of heating surface. Guaranteed to operate at a minimum of 80% efficiency, Cyclotherm gets more out of the fuel it burns, gives you substantial savings in gas or oil and in maintenance.

AN ELECTRONIC CONTROL SYSTEM operates Cyclotherm automatically. On 18 to 60 hp units, burner shuts down when steam demands are satisfied, starts up when steam again is needed. On larger units, precision modulation keeps peak efficiency with boiler operating at from 30% to 100% of rated capacity. Many users report up to 50% savings in maintenance costs.

Cyclotherm comes to you fully assembled and factory pre-tested. Needs only five simple connections to be ready to go. Many plants have installed two or more Cyclotherms for greatest flexibility and power. Burns gas or oil with quick changeover. In 18 to 500 hp models, 15 to 200 psi. Fill out coupon below and mail today.

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STEAM AND HOT WATER GENERATORS

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**Comments on Tidewater's Delaware
Flying A Refinery . . .**

Burning FLUID COKE



STEAM AND POWER for the huge Flying A Refinery of the Tidewater Oil Company at Delaware City, Delaware, is supplied by three Riley generating units having a rated capacity of 500,000 lb/hr at temperatures of 950 F and at 1425 psig. Generating units are owned and operated by the Delaware Power & Light Company. This is one of the first boiler installations specifically designed to use fluid coke as a primary fuel.

What Is Fluid Coke? — It comes from a new refining process which produces a high yield of gas-oil, which can be cracked to high octane gas and a relatively low yield of coke. The Stock Equipment Co., suppliers of valves and scales for the pulverizing operation, emphasize that the particles pour freely and are clean in comparison with regular petroleum coke. It burns with a minimum of ash. Even allowing for an extra high ratio of unburned carbon, up to 20%, heat output is comparable to that of coal of about 14,000 Btu/lb. Auxiliary fuel, such as oil, gas or high volatile coal, must be used to bring coke up to ignition temperature and maintain a regular flame.

Engineering Data — Power and plant engineers desiring detailed design information on the steam-generating equipment developed should check "Burning Fluid Coke"

pages 921-925, *Mechanical Engineering* for October, 1956. Riley Stoker Corporation engineers give an excellent summary of the fluid-coking process, furnace design, and reports on a field test on a boiler unit of the Carbide & Carbon Chemicals Corporation at South Charleston, West Virginia.

Alloy Piping — Into this gigantic refinery (130,000 barrels of crude oil daily) went great quantities of fabricated pipe of numerous sizes and various metallurgical content. The Flori Pipe Company delivered more than 1,500 tons of fabricated alloy to C. F. Braun & Co., who engineered and constructed the refinery as prime contractor. Approximately 1,400 separate pieces, averaging more than a ton apiece were fabricated, with wall thickness ranging up to 1½" and diameters up to 20". Operational requirements in the refinery included temperature ranges to 1450 F and pressure ranges to 900 psi. In the power plant operating characteristics are 1350 F and 950 psi.

To meet these requirements, Flori fabricated thirteen different alloys: Specifications required 100% penetration, without the use of backing rings for all welds. All butt welds were radiographed; nozzle welds and coupling welds were either magnetic particle inspected or penetrant dye checked.

Process Water — Nine Byron Jackson pumps (with provision for three more units) move water from the Delaware River to the giant refinery's processing area. Each of the nine pumps are driven by a vertical 2000 hp motor at 600 rpm and will deliver 34,000 gallons of water per minute at 184 ft head. Pumps discharge into two reinforced concrete lines 78" in diameter which extend about 5,000 ft to the refinery distribution system.

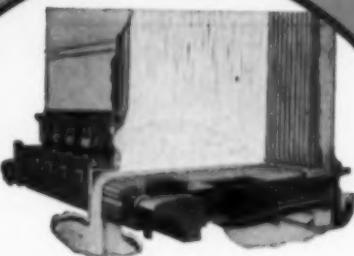
Direct-fired oil heaters in the refinery are also designed for fluid coke burning. Units, designed by Foster Wheeler, are capable of heating 130,000 bbl of crude per day. Design data is featured in the November-December issue of *Foster Wheeler Corporation's Heat Engineering*. There are two direct-fired heaters — one for the atmospheric stage of the crude distillation unit and the other for the vacuum stage. The atmospheric heater is as high as a seven-story building.

Fluid coke can be burned in these two heaters at a rate of approximately 220 tons per day which would supply one-half the total direct heat absorption requirements of the distillation unit when operating at full capacity. Fuel oil or gas burning will supply the other half. In brief, the operation will be a 50:50 coke-oil or gas burning.

USE DETROIT SPREADER STOKERS TO BURN SOLID FUELS WITHOUT EXPENSIVE PREPARATION

DETROIT ROTO GRATE • ROTO STOKER • ROTO STOKER (TYPE C-C)
HIGH ECONOMY AND AVAILABILITY • LOW MAINTENANCE

1



DETROIT ROTOGRADE

Original spreader stoker with forward moving grates that discharge the ash at the front. Our long experience has contributed to many exclusive refinements and features of design. Proven superiority with hundreds installed here and abroad. For capacities up to approximately 400,000 pounds of steam per hour.

Detroit Stokers burn any Bituminous Coal or Lignite without special preparation. Commercial sizes ranging from $\frac{3}{8}'' \times 0''$ to $1\frac{1}{4}'' \times 0''$ are ordinarily used. High burning rates without clinkering difficulties. Also many refuse fuels including wet bark, hogged wood, bagasse, etc. are burned separately or in combination with coal; efficiently and without smoke.

Widely fluctuating loads are easily handled. Parasite power is negligible. High overall efficiencies at all capacities are assured. Maximum availability and very low maintenance.

Buy "Detroit"—They are "the most".

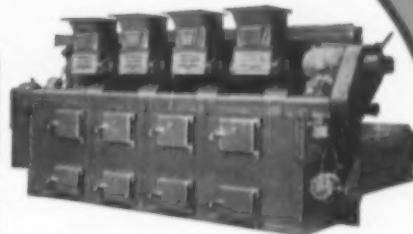
2



DETROIT ROTOSTOKER

For small and medium size units. Power Dumping, Hand Dumping or Stationary grates to fit the furnace provide desired capacity under full automatic control.

3



DETROIT ROTOSTOKER (TYPE C-C)

Continuous cleaning type particularly suited to highly fluctuating loads. Many sizes for capacities of 5,000 to 75,000 pounds of steam per hour. Reciprocating grates discharge ash at front. No basement is required.

DETROIT STOKER COMPANY

MAIN OFFICE AND WORKS — MONROE, MICHIGAN

District Offices or Representatives in principal cities

WRITE FOR BULLETINS ON THESE MONEY SAVING STOKERS

At Little Rock, Ark. . . .

Electric Lift Trucks Serve Bottling Plant

SINCE the Coca-Cola Bottling Co., Little Rock, Arkansas, has employed Barrett-Cravens battery-powered lift trucks, materials and goods are handled in larger loads; large numbers of man-hours are

saved; shipments are expedited; and fewer trucks take up less space.

Plant has a capacity of 600 bottles per minute. Thirty motor trucks are loaded from one to three times daily with this output. For the movement of stock, materials and empties, this plant has used Barrett hand lift trucks since 1928. Barrett Steeleg Skids are also employed.

Cost of handling rose with hour-



ly wage rates through the years. A remedy was found when the company purchased its first Barrett Power Ox battery-powered lift truck of 4000 lb capacity. Two more trucks have since been added.

The plant superintendent states that one man with a Power Ox now does the work formerly done by three men and three hand lift trucks.

get
TOP
horsepower

at
MEDIUM
steam
pressures

with
LOW
steam
consumption!

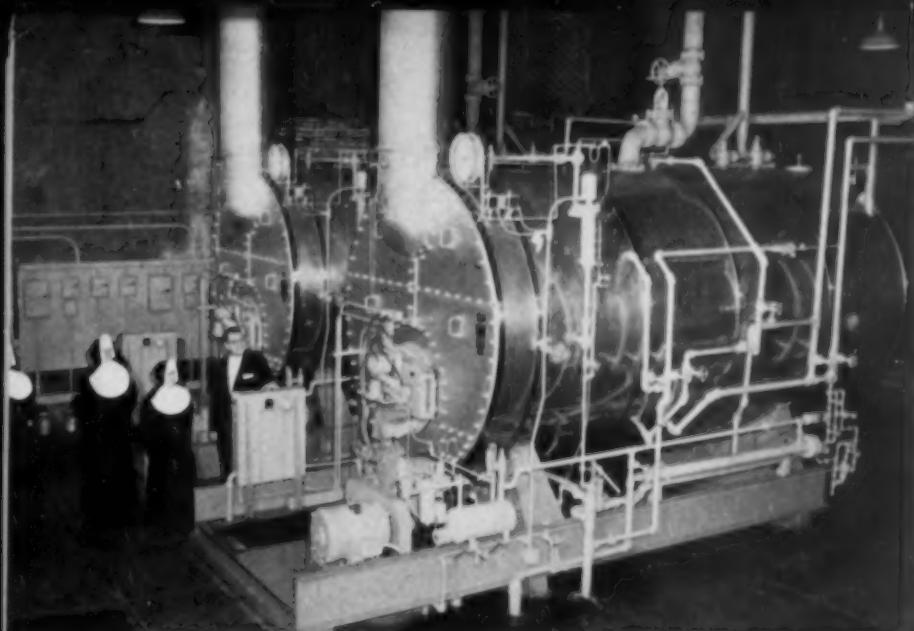
Choose from the improved DH Line of Dean Hill horizontal turbines which give you up to twice the power of earlier models while maintaining the same economy of operation.

The major change contributing to this tremendous power increase is the addition of steam nozzles to all models. On types now built with two nozzles—DH-10, DH-15, DH-20, DH-25—this change has meant a 100% increase in the maximum horsepower of each unit! On new three-nozzle models—DH-30, DH-35, DH-40, DH-45—the rated increase in maximum horsepower is 50%!

Why not get the complete power picture of Dean Hill's improved DH Line of horizontal turbines? Write today for Turbine Catalog, No. 500.

DEAN HILL PUMP COMPANY
Pump and Turbine Engineers Since 1893
Indianapolis 7, Indiana

OFFICES IN PRINCIPAL CITIES



NEW BOILERS combine efficiency and handsome appearance. Edward S. Green, Edgemont (Pa.), contractor, was responsible for this superior installation. Pictured left to right are: Sister M. Cor Immaculatum, Immaculata College Treasurer; Sister Jean Marie, Community Treasurer; Reverend Mother Maria Alma, Superior General and Salvatore S. Guzzardi, Consulting Engineer.



OLD BOILER was a coal-fired HRT model — typical of many replaced by modern Cleaver-Brooks oil, gas or combination oil/gas fired boilers.

Consulting engineer* tells how Immaculata College boiler modernization saves estimated \$12,000 each year

Salvatore S. Guzzardi CONSULTING ENGINEER
2926 LEWIS TOWER - PHILADELPHIA 2, PA. - KINGSLEY 6-2777

Mr. John C. Cleaver, President
Cleaver-Brooks Company

December 20, 1956

Dear Mr. Cleaver:

Recently our office was retained to make an impartial, exhaustive engineering study of the 40-year old boiler plant and steam system at Immaculata College, Immaculata, Pa., which is staffed by the Catholic order, Sisters of the Immaculate Heart of Mary. As a result of our recommendations, two fully automatic, oil-fired, 350 bhp Cleaver-Brooks package steam boilers, (12,000 lbs/hr steam each), replaced three hand-fired coal boilers and steam-driven auxiliaries. The new boilers are operating at approximately 80% boiler efficiency year-round.

Conversion of coal firing to automatic #6 oil firing and increased boiler efficiency has reduced the fuel cost approximately 50% — amounting to a saving of \$12,000 each year.

The Cleaver-Brooks boilers burn #6 oil and operate automatically at 80 pounds steam pressure 'round the clock — without the presence of operators in the boiler room. Eliminating boiler plant labor saves the College \$7,500 each year.

The cost of the boiler plant modernization will be paid for out of fuel and labor savings in approximately 2-1/2 years. Commendation for this outstanding performance of the Immaculata boiler plant is due to your well-engineered boiler design and to the cooperation of your skilled servicemen. The results achieved were so impressive that the Sisters subsequently modernized their Villa Maria Convent, Westchester, Pa., with two 100-bhp Cleaver-Brooks boilers.

Sincerely yours,

Salvatore S. Guzzardi

***Salvatore S. Guzzardi** — Award-winning head of an organization of experienced professional engineers specializing in modernizing power service facilities. Clients include: Pennsylvania University, Baldwin-Lima-Hamilton Corp., H. Doroff & Sons, Sun Shipbuilding & Dry Dock Co. and City of Philadelphia.

Surveys show 32% of boilers now in service are 30 years old; 56% are over 20 years old

If your boiler fits this description, we recommend an immediate survey. "In 90% of the plants surveyed," summarizes Mr. Guzzardi, "we have found it possible to save thousands of dollars and to pay for the recommended improvements out of annual savings within one to three years."

Again and again the proved economy of Cleaver-Brooks four-pass, forced-draft boiler design results in savings reports as impressive as this. Contact your nearest Cleaver-Brooks representative for more facts on the complete line of steam and hot water boilers — 19 sizes, 130 models, 15 to 600 hp — for heating or processing. Or write Cleaver-Brooks Company, Dept. C, 305 E. Keefe Ave., Milwaukee 12, Wis., U.S.A. Cable Address: CLEBRO — Milwaukee — all codes.

Cleaver Brooks

ORIGINATORS OF SELF-CONTAINED BOILERS

Fast Patching Method



The two components of the metallic putty. The small bottle contains the exact amount of curing agent required for the five-ounce can shown. Maintaining the correct ratio is important to obtain a final patch with the desired properties.



An industrial vacuum cleaner lid has Metalset repairs ground down with a belt grinder. Machining of this material is identical to machining metals and no special considerations have to be given to handling patched areas.

Tennessee foundry uses metallic putty for repairs . . .

A NEW PLASTIC compound has proved itself a most versatile and valuable tool in the production by Southern Casting Company of aluminum castings for both industrial and consumer products.

The material, an epoxy resin compound containing powdered aluminum, is currently being used by us for salvaging defective castings, cementing gates to patterns, and for making modifications in the patterns themselves. Upon occasion, it has been used to caulk metal air lines carrying 130 psi.

In every instance this material, called "Metalset" A2 and manufactured by Smooth-On Manufacturing Company, has shown itself superior to prior methods in that it is easier to use, cheaper, more efficient, and more acceptable to our customers.

By Robert E. Williams
Southern Casting Company
Sevierville, Tennessee

The metallic putty originally was tested by Southern Casting primarily as a patching material. After more than a year of use, the compound has shown itself to be the best available material to repair imperfect castings, when the casting is not destined for structural or mechanical uses. Use of Metalset has virtually eliminated aluminum soldering from our foundry.

Defects in castings formerly were patched by aluminum soldering. Most repairs made in this way by a semi-skilled and careful solderer were excellent. Unfortunately, however, only one individual at Southern Casting has sufficient experience with this

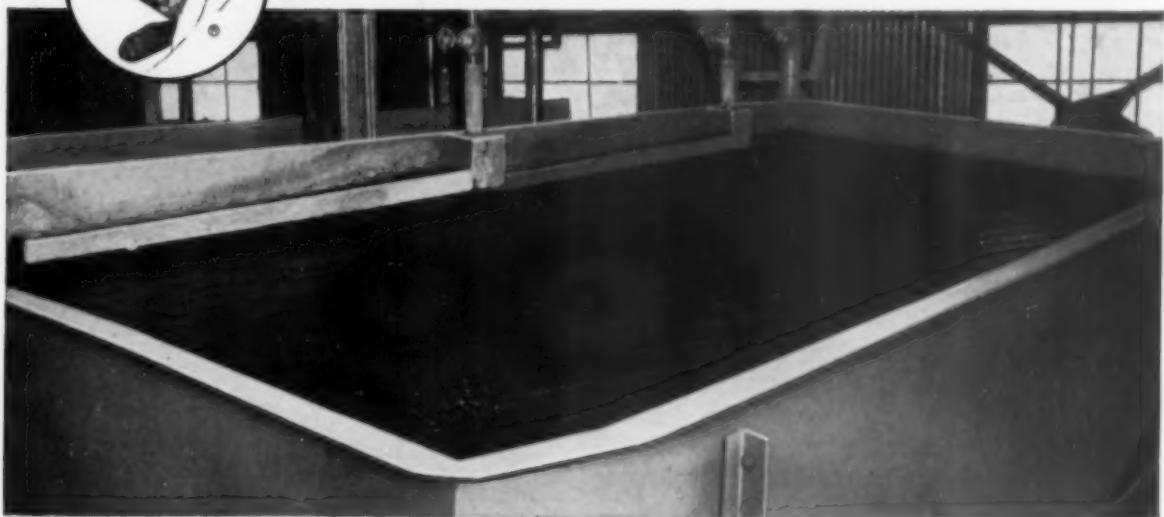
procedure to produce passable repairs.

The advantages with the patching compound are not solely due to the numbers of rejects saved from the melt pot. Of greater importance is the fact that any of the five men in our shipping and cleanup department can make a passable repair using the new material.

The epoxy compound is extremely easy to mix and use. It comes as a two-component item, the basic resin containing finely powdered aluminum and the liquid curing agent. Curing is by polymerization or chemical action and, according to the manufacturer's literature, shrinkage is 0.002 in./in. Other physical properties include a compressive strength of 14,400 psi and a Rockwell hardness of M-70.



WHY CHESSIE'S RAILWAY IS FIRST IN COAL



SUPERIOR COAL. This Deister Table for washing slack is an example of the up-to-date methods employed by producers on the C & O to give you the highest quality and performance in the type of coal best suited to your needs. Superior coal means lower ultimate cost.

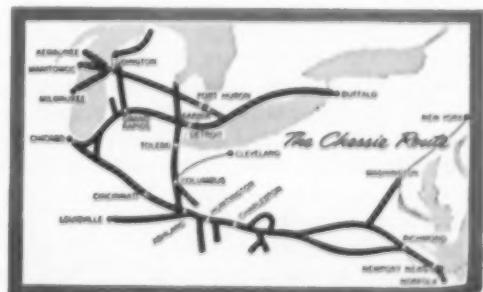


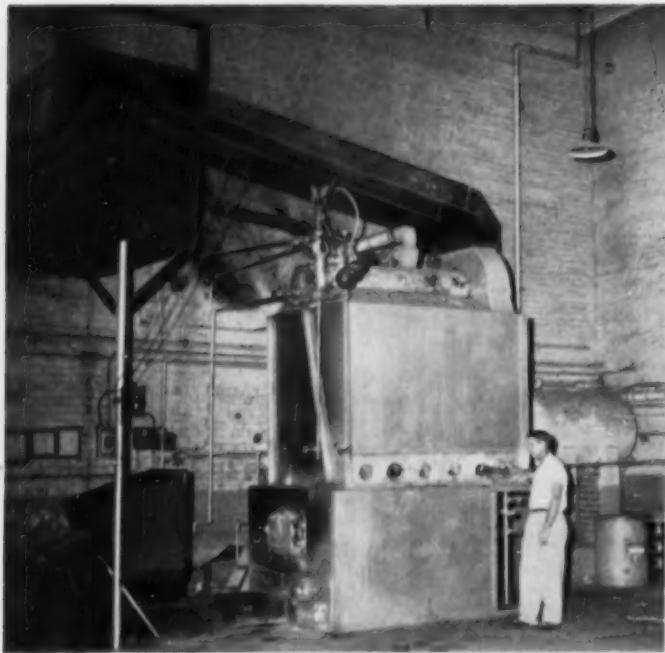
SUPERIOR SERVICE. Chesapeake and Ohio operates the world's largest fleet of coal cars with ample power to move them. By its prompt repair program C&O keeps more than 99% of these cars in good order. And C&O's new car reporting system can give you the exact location of any car on C & O lines at any time.

For dependable deliveries of top quality coals, contact coal producers on the C & O. And if you need help in meeting your own particular fuel requirements, write to: R. C. Riedinger, General Coal Traffic Manager, Chesapeake and Ohio Railway Co., Terminal Tower, Cleveland 1, Ohio.

Chesapeake and Ohio Railway

WORLD'S LARGEST CARRIER OF BITUMINOUS COAL





Boiler Saves Four Cars of Coal per Year

ONE NEW 125 hp boiler replaces three old boilers at Craftspun Yarns, Inc., Kings Mountain, N. C. Furnished by Queen City Engineering Company, Charlotte, N. C., the new boiler is compact, saves space, and is efficient enough to save the mill four cars of coal a year.

The new boiler was installed as part of a modernization program initiated by the Scranton Lace Company upon acquisition of the mill in 1946. The company spent about \$400,000 to improve actual working conditions before any major machinery improvements were made, according to C. W. Swan, Jr., president of Craftspun. The new boiler serves to improve working conditions while qualifying as an improvement of machinery and equipment.

"Conferences"

(Starts on Page 68)

siderable money for which good old CBC got just an even zero.

Seriously

This conference thing has grown into a time devouring monster using energy and money to staggering dimensions and, if allowed to go on, it will likely destroy all belief in Santa Claus.

Most conferences appear to justify appointing committees; com-

mittees have sub-committees. They all have conferences and this goes on and on in all levels of our American business and civic life. Some are called investigations.

If such conditions continue it may soon be expedient for each and every organization to develop a separate and distinct department, a Department of Conferences, to control this rapidly growing American way to let so many people loaf, use up lights, air conditioning space, and get something off of their chests. This is a nasty thing to say but, most important of all, get back into the jobs they

are supposed to do and return value received.

Slide Rulers Also

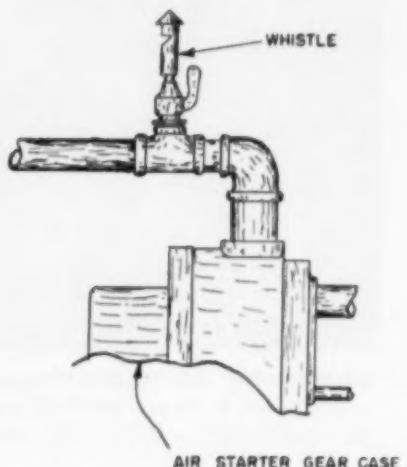
The engineering profession is not free of this "Meeting Virus" and the shortage of engineers will not be improved by them drifting into time wasting conferences.

Charles Low, the inventor, ably presented his views on the subject thusly: "A conference is a group of people with no information who got together to pool their ignorance. The only thing that will stop a conference is one man who knows what to do."

All of which reminds us we are a few minutes late to that 1:00 p.m. conference.

Starting 4-Cycle Engines

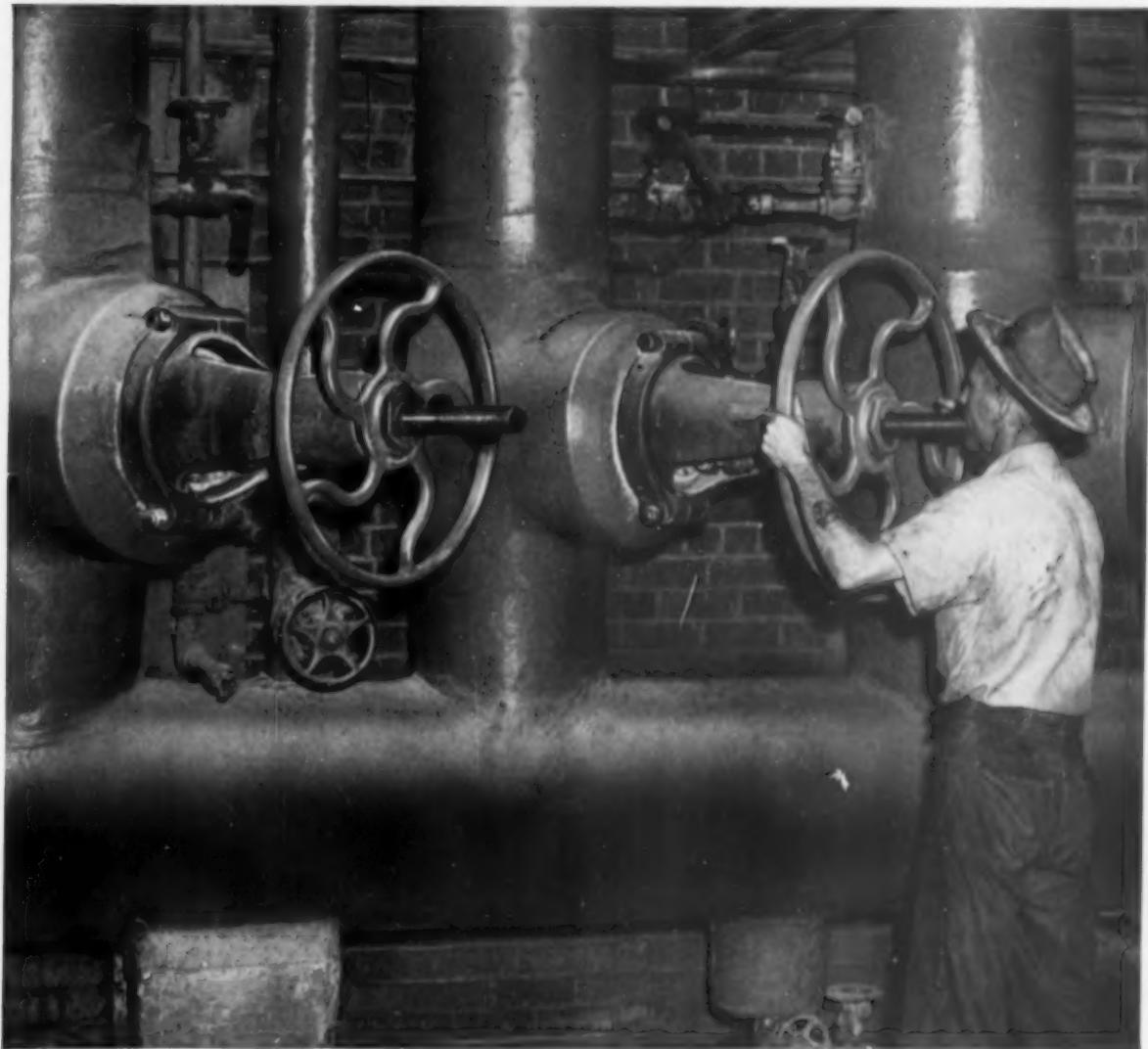
THIS WHISTLE indicates when the pistons of a 4-cycle engine are in the right position for starting. It was installed on the compression relief vent line so that when the engine is turned over, the compressed air escapes through the compression release valve and blows the whistle.



It is possible for one man to spot the engine prior to starting. Previously it was necessary for one man to bar the engine while another man held his hand over the vent to determine when the engine was properly spotted.

By HARVEY T. MITCHELL, Repairman, Opelousas Gas Plant, Humble Oil & Refining Co., Texas.

No Bonnet-Joint Maintenance—No Bonnet-Joint Leakage



**These valves helped the maintenance crew
win a losing battle**

This process industry plant saw the danger signal. Servicing leaky valve bonnet joints was taking too much time. Other important maintenance work was being neglected.

That's why, in 1947, when expanding the power plant, Crane Pressure-Seal Bonnet Gates were chosen for main steam service as shown above. Working pressure: 600 psi at 725 deg. F.

These Crane valves need no bonnet joint maintenance. The joint is leakproof—sealed

tight by internal fluid pressure. Crane alloy seats and flexible wedge disc make closure tight and easy.

To date, the Crane Pressure-Seal Gates have given this plant over 9 years' uninterrupted service. The maintenance crew hasn't touched them except for routine care.

Full information on these modern power service valves is given in Circular AD-1936. Get a copy from your Crane Representative or by writing to address below.



Ask for Circular AD-1936

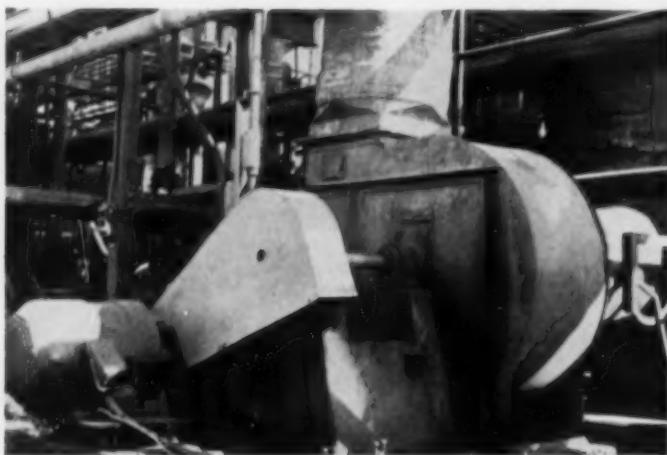
CRANE VALVES & FITTINGS

PIPE • PLUMBING • KITCHENS • HEATING • AIR CONDITIONING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

Equipment . . . Supplies . . . Methods

FOR FREE INFORMATION — Circle Code Number on Page 89 Return Card



Corrosion Resistant Coating

C-1 A new, corrosion-resistant coating that can be applied by brush, roller, or spray, has been developed by the Perma-

spray Manufacturing Corporation, League City, Texas. The Company states that metals properly cleaned and coated were submerged for 18 month periods in hydrochloric acid, caustic soda, salts, gasoline and fuel

This Permaspray coated blower, handling a 20% concentrate of hydrochloric acid gas at 110-120 F, has withstood 3 years service in Gulf Coast chemical plant. Permaspray can be brush, roller or spray applied.

oils, without signs of breakdown.

In tests made on all types of surfaces in a Gulf Coast plant under severe conditions, parts of structures coated with Permaspray have withstood three years exposure to hydrochloric acid, caustic fumes, and weathering conditions.

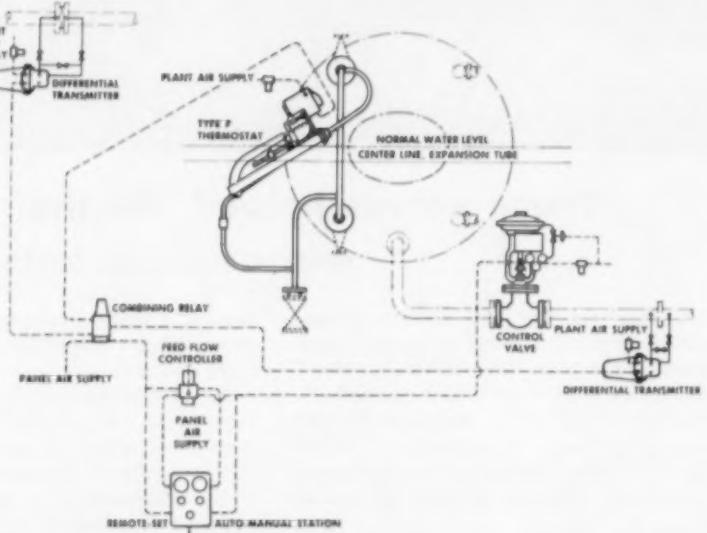
Permaspray's excellent corrosion-resistant properties, plus several methods of application — brush, roller or spray — make possible tremendous savings on structures and equipment for processing, utility and large service plants. For best protection, two coats of Permaspray should be applied, each coat approximately 3 mils thick; each coat dries to a hard finish in 4 hours.

Balanced Feedwater Regulator for High-Duty Generators

C-2 A new feedwater regulator, which matches feedwater input to steam output, regardless of load conditions, has been developed by the Copes-Vulcan Division, Blaw-Knox Company, Erie, Penn. It also holds drum level within close limits, despite changes in load or feedwater pressure.

Control, in the new Copes Balanced Flow Type P feedwater regulator, is modulated by three influences — drum water level, feedwater flow and steam flow.

The two flow influences are obtained from primary elements of flowmeters. Each acts on a force-balance transmitter which sends an air impulse to a balancing (combining) relay. The transmitters can be mounted without regard to each other because they are not mechanically linked in any way. Drum-level impulse to the balancing relay is sent out by a pressure-compensated pilot operated by an inclined thermostatic tube.



A simple slider adjustment on each transmitter permits modifying the output range to give a rising, lowering or practically constant drum water-level characteristic. The balancing relay permits either bias ad-

justment or 1 to 1 combining of the three control influence.

The system can be equipped with either diaphragm or piston operated

(Continued on Page 80)

Designed to keep you in production



Westinghouse high-voltage starters with type BAL fuse

Fault interruption for motors and power systems is provided by limiting and interrupting a fault in less than $\frac{1}{2}$ cycle. Instantaneous interruption minimizes possible damage to the affected motor and isolates the fault so other equipment is not shut down.

Westinghouse high-voltage starters are available for induction or synchronous motors up to 3000 hp and for power systems up to 250,000 kva at 4800 volts.

Reliable Westinghouse equipment such as the new type H air break contactor—good for millions of operations—plus the exclusive space-saving type BAL fuse for increased reliability—keeps production moving!

Call your Westinghouse sales engineer about installing the finest high-voltage starter in your plant. Or write Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa. Ask for Bulletin B-6535. J-21935

**YOU CAN BE SURE...IF IT'S
Westinghouse**



"Continental Conveyors have improved our coke quality"

"Our Continental coke loading boom installation at our plant at Holt, Ala. has played a big part in improving the quality of our coke," says Newton DeBardeleben, president of the "Southwide and Diversified" DeBardeleben Coal Corporation, headquarters, Birmingham, Ala. "It has materially decreased degradation and segregation of sizes in moving coke from our screening plant to railroad cars. It has been in service since 1951 without a shutdown."

In many installations in the coal field, where uninterrupted trouble-free operation is so vitally important, Continental conveyors have scored outstanding records because of their:

RUGGED RELIABILITY BALANCED DESIGN
LONG LIFE MINIMUM UPKEEP
SMOOTH PERFORMANCE
ECONOMY OF OPERATION

Continental's wide product range and engineering know-how can provide a conveying system tailored to your specialized needs. Phone or write any of our offices for complete information.

CG-5716

INDUSTRIAL DIVISION CONTINENTAL GIN COMPANY

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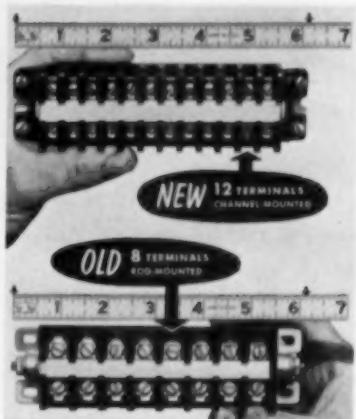
KNOXVILLE
NEW YORK 17

Equipment, Supplies & Methods (Cont'd)

control valves having rectangular, characteristic-V, sleeve or beveled-seated ports to match plant operating conditions. Almost any desired opening or closing force can be provided. Ports have flow areas exactly suited for specified flow and pressure conditions.

The auto-manual control station permits remote manual control of the feed valve. Having no "seal" position, transfer from manual to automatic and vice versa is fast and bumpless.

For more Free Data CIRCLE CODE NO. on the Handy Return Card — Page 89



Terminal Block Design

C-3 A new channel-mounted terminal block with 50% more terminals in the same space and featuring greatly simplified assembly and modification has been announced by **Square D Company**, 4041 North Richards Street, Milwaukee 12, Wisconsin.

These blocks are 25 ampere box lug type terminals. Also available in the new design are 25 ampere terminals with pressure wire connectors and 50 ampere box lug terminals. All three types may be grouped in any manner on the same channel.

An important new feature of these terminal blocks is their channel mounting which permits the blocks to be constructed in any desired number as an easy "do it yourself"

project. Channel mounting makes it possible to add new terminals to existing blocks, either at the ends or in the middle, using only a screwdriver and with minimum disturbance of existing terminals.

High Voltage Starter

C-4 A new, high voltage starter, Type ZHA (2200-4800 volts), has been introduced by The Electric Controller & Mfg. Co., a division of the Square D Company, 520 N. Michigan Ave., Chicago 11, Ill. Completely accessible from the front, these starters may be mounted directly against wall (as illustrated) or in double rows, back-to-back. Very compact, the Type ZHA is only 30-in. deep — an important feature where floor space is a factor.

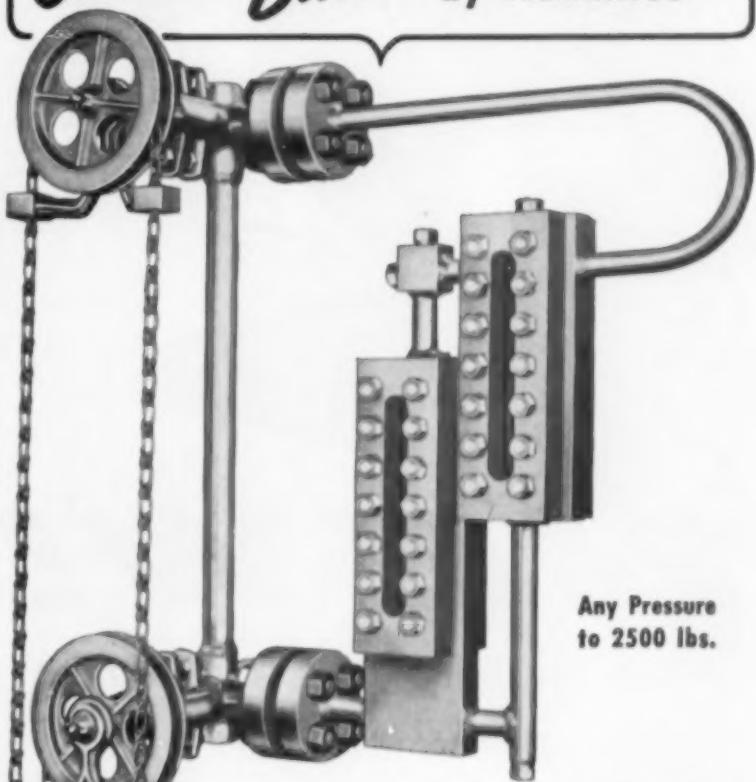
This new starter is self-contained, complete with control transformer supplying low voltage for push button circuits. When starters are ganged, only one incoming feeder is required. Additional starters can be added as needed, with no sacrifice in streamlined appearance. The Type ZHA is also available with self-contained bus in an isolated compartment.

It is furnished in three interrupting ratings for squirrel cage, synchronous and wound-rotor motors. Class E1—50,000 KVA (certified). Class E2 — with current limiting fuses and high interrupting capacity contactor. At 2300 volts: 150,000 KVA, 3 phase; 60,000 RMS amperes asymmetrical. At 4,800 volts: 250,000 KVA, 3 phase; 60,000 RMS amperes asymmetrical.



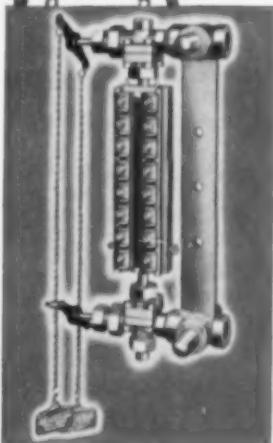
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30" DEEP!

Direct-to-Drum Gage Assemblies *Custom Built* by Reliance



Any Pressure
to 2500 lbs.

Rugged construction in expansion or "L" end types for highest safety and low maintenance



Made to fit individual needs, Reliance direct-to-drum assemblies meet highest engineering and construction standards. Reliance all-welded gage assemblies have more than sufficient ruggedness for severest conditions. Each unit is tested at well over 50% overload before it leaves the factory.

In the expansion tube type, a sturdy tie-tube is welded to both gage valves for rigidity between boiler connections. Gage windows are Mica-protected flat glass (to 1500 lbs.) or non-shattering Micasight — safest gage obtainable for the higher pressures. Valves — heavy duty forged steel, temperatures to 750°. Various combinations possible in other types, pressures 900 to 2500 lbs. Efficient illumination equipment available, including the powerful mercury lamp type. Write the factory or nearest Reliance Representative.

The Reliance Gauge Column Co., 5902 Carnegie Ave., Cleveland 3, Ohio

Reliance®
BOILER SAFETY DEVICES



NEW!

Blaw-Knox Grating and Tread Catalog

This brand-new, comprehensive catalog presents more useful application information than ever before. Complete descriptive information such as spacings, weights, panel widths and bearing bar surfaces are included for each type of grating.

In addition, a wealth of useful data such as tables of safe loads, fastening methods, and model specifications are included.

If grating application and installation is part of your responsibility, you should have a copy of this useful publication. Send for your copy today. No obligation, of course.



BLAW-KNOX COMPANY

Blaw-Knox Equipment Division

1110 Blaw-Knox Building, 300 Sixth Avenue, Pittsburgh 22, Penna.

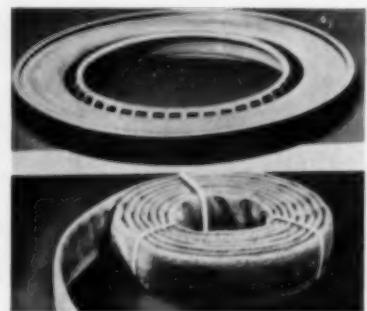
GRATING APPLICATIONS: floors • platforms • walkways • catwalks • stair treads • fan guards • shelving • and many other uses, both outdoors and indoors, for versatile steel grating

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1110 Blaw-Knox Building • 300 Sixth Avenue
Pittsburgh 22, Pennsylvania

Gentlemen: Please send me a copy of New Blaw-Knox Grating Catalog 2527.

Name	Title
Company	
Address	
City	Zone State

Equipment, Supplies & Methods (Cont'd)



Above—Due to wide temperature range of silicone rubber, this Klosure oil seal with silicone sealing element is especially suited to use on diesel engine crank cases and other high speed, high temperature applications.

Below—Silicone treated asbestos insulation tape for covering hot piping is made with a flap along one edge to facilitate wrapping.

Silicone Packing Materials

C-5 A complete selection of silicone rubber packing materials has recently been introduced by The Garlock Packing Company, 402 Main St., Palmyra, New York. Silicone rubber applies to a great many applications because of its resistance to aging, sunlight and ozone, and its low compression set. Silicone's ability to withstand high and low temperatures, its excellent dielectric properties, its good resistance to low swell mineral oils at high temperatures and to a variety of chemicals, make it an excellent sealing material.

Garlock silicone products include diaphragms, gasketing, sheet packing, oil seals, rings, insulation tape and rod and valve stem packing. In addition to these it is also available in sponge and in molded, extruded, die cut and metal-bonded shapes.

Stainless Boiler Feed Pump Injects Hydrazine

C-6 A low-capacity, self-priming positive displacement pump in 304 stainless steel is available from Eco Engineering Co., 12 New York Ave., Newark 1, N. J.

It has been designed specifically to inject hydrazine in make-up

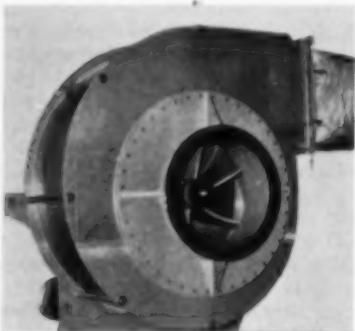
water for boiler feed treatment. Hydrazine, acting as an oxygen scavenger to reduce corrosion in steam systems, is gaining wide acceptance in industry for this application.

Capacities are to 10 gpm and pressures to 75 psi. Higher pressures can be obtained by multi-staging. Pumps are available in all conventional types of mountings and with electric motor, air motor, pulley and chain drives.

For more free data CIRCLE CODE NO. on the Handy Return Card — Page 89

40" PVC Centrifugal Blower

C-7 The newest plastic centrifugal blower developed by **Industrial Plastic Fabricators, Inc.**, Endicott St., Norwood, Mass., is the Model CB-40M, a 40" diameter corrosion resistant PVC unit, with a capacity of 15,000 cfm. Company's line now ranges from 143 to 15,000 cfm.

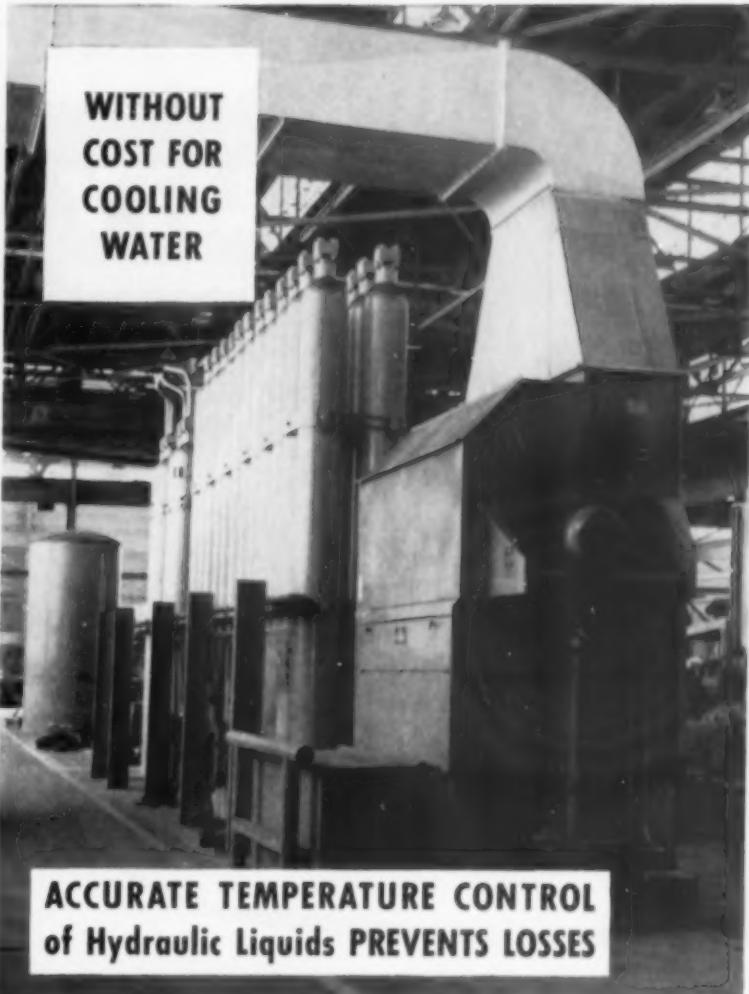


The new model is especially applicable to installations used to expel corrosive air and fumes. Metal blowers, even when coated with expensive protectives have been found to involve costly maintenance and replacement. The CB-40M Centrifugal Blower is constructed of Unplasticized Polyvinyl Chloride. This is not a coating, but a material with which the housing and impellers are constructed.

Blowers are equipped with a PVC shaft seal to give long service life to the main drive shaft. Inlet and outlet flanges, gaskets, and drain plug are standard PVC parts of IPF Blowers.

Performance charts and complete details are given in Bulletin 102.

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COST FOR
COOLING
WATER



ACCURATE TEMPERATURE CONTROL of Hydraulic Liquids PREVENTS LOSSES

● This **NIAGARA AERO HEAT EXCHANGER** cools the liquid for a large hydraulic press, preventing heat damage to the pump stuffing boxes. Using outdoor air as the evaporative cooling medium, it removes the heat at the rate of input (1,875,000 BTU/hr.) with no cooling water consumption except a negligible amount evaporated.

Air is free and cheaper to move than water. You can save much expense in pumping, piping and power, and quickly recover the equipment cost from the water saving.

Similar Niagara machines cool water, oils, solutions, lubricants and coolants for many mechanical, electrical and chemical processes. You can cool quench baths, welding machines, plastic molds, furnaces, controlled atmospheres, gases, compressed air either for power or instruments or processes. In a closed system, your coolant is never contaminated. The system is simple and easy to keep up; the equipment has a long, useful life. Select from a wide range of sizes up to 30,000,000 BTU.

Write for Bulletin 120 to obtain a complete description.

NIAGARA BLOWER COMPANY

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New York 17, N. Y.

Niagara District Engineers in Principal Cities of United States and Canada

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without question

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Atlantic Steel Company

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Equipment, Supplies & Methods (Cont'd)



Instant Fuel Changeover in Forced Air Space Heater

Heart of the new line of Counterflow space heaters by Dravo Corporation, Neville Island, Pittsburgh 25, Pa., is an induced draft Pyro-Jet burner that automatically and interchangeably fires natural gas or light oil. For firing heavy No. 5 oil the burner employs an unusual dual preheating system.

The Pyro-Jet is described as a "ring and finger" design. Gas ports and oil nozzles of instant switch-over gas/oil models are so arranged that the flame from one cannot impinge upon, nor in any way affect the operation of the other. For firing No. 5 fuel oil, air atomization and a dual preheating system are employed which provide hot oil "right at the nozzle" before the burner attempts to light off.

Heavier oils must be heated to a minimum temperature of 175 F to assure dependable start from electric spark ignition. After flame has been established, an oil temperature of 135 F will result in satisfactory operation.

Dravo's dual preheater system provides these conditions. When the thermostat calls for heat, both preheaters and fuel pump are energized, but the valve controlling flow to the nozzle remains closed. Oil circulates between pump and main

preheater while the "accelerator" heater is bringing oil at the nozzle to 175 F, at which point the solenoid valve opens to permit flow from the pump preheater loop into the nozzle feed line. The "accelerator" preheater is then de-energized and remains out of operation until the next start up cycle occurs.

The new Counterflo line is available in sizes ranging from 250,000 Btu/hr to 2,000,000 Btu/hr output capacity.

For more free data CIRCLE CODE NO. on the Handy Return Card — Page 89

Tubing Cutter

C-9 A new tube cutter for copper, aluminum, brass and plastic tubing, called the Pipemaster Tube Cutter 3T, has been introduced by The Erie Tool Works, Bacon and French Sts., Erie, Pennsylvania.

The tube cutter is exclusively designed to provide from $\frac{1}{8}$ " to $3\frac{1}{2}$ " capacity — the first and only cutter to achieve this full range. Every size tubing from $\frac{1}{8}$ " to 3" is backed by two of the cutter's four rollers, so that all cuts are straight and smooth without distorting the tube out of round.

The Pipemaster 3T not only operates with minimum manual effort, but, because of its full-range capacity, eliminates the need for two cutters or the cumbersome hacksaw. Standard tube cutter wheels are easily and quickly changed. The cutter weighs 2 lb, 9 oz and, because of its compact design, can be carried in a shirt pocket.

General Purpose Centrifugal Pumps

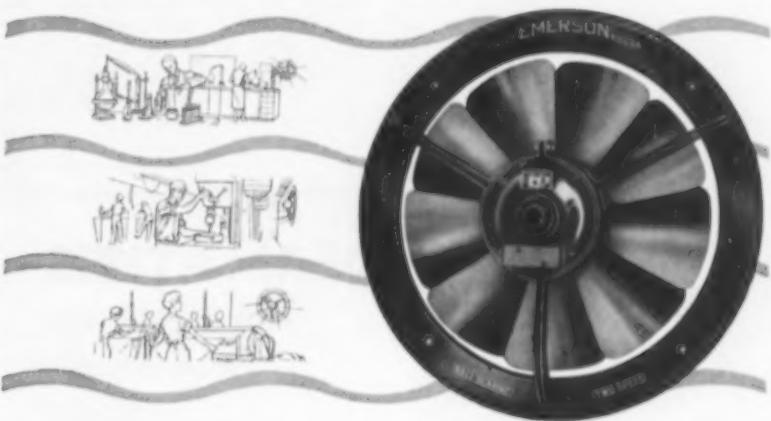
C-10 For pump users wanting to conserve on space and investment, Dean Brothers Pumps, Inc., 323 W. 10th St., Indianapolis 7, Ind., are producing the Type GSC standard close coupled centrifugal pump line — capacity up to 600 gpm; total dynamic head up to 275 ft; and temperature of liquid from minus 40 F to plus 250 F.

The seven-pump-line is available in bronze fitted, all iron and all bronze. Circular 191 gives design and construction data.

EMERSON-ELECTRIC

Exhaust Fans

put new life in lazy air!



Reduce fatigue...keep personnel alert and efficient by removing excessive heat, steam, dust and odors!

These EMERSON-ELECTRIC exhaust fans actually cut down your labor costs by helping to keep personnel working at top efficiency. Heat, dust, odors and steam are removed from plants and laboratories . . . reducing fatigue and making work more pleasant.

EMERSON-ELECTRIC Direct-Drive ball-bearing Exhaust Fans have fully enclosed motors . . . self-cooling for continuous operation. Available in 12" single-speed and 16", 18", 24" and 30" two-speed models, capacities up to 6700 C.F.M. Three other models, 12", 16" and 18" with sleeve-bearing motors, have automatic outside shutters attached. Write for Bulletin No. 2011 today!

The Emerson Electric Mfg. Co., St. Louis 21, Mo.



EMERSON-ELECTRIC

Belt-Drive, Ball-Bearing Exhaust Fans

Move large volumes of air quietly and economically. Deep-pitched balanced blades are driven by powerful Emerson-Electric lifetime motors. Five sizes — 24" to 48"

Low Initial Cost!
Low Operating Cost!

EMERSON-ELECTRIC

OF ST. LOUIS



Since 1890

Plug-In Comb. Lighting & Power Distrib. Panelboard

C-11 A new plug-in combination lighting and power distribution panelboard, designed to accommodate combinations of single-, two-, and three-pole circuit breakers up to 54 poles, has been announced, **General Electric's Distribution Assemblies Department, Plainville, Conn.**

With a maximum rating of 240 volts, alternating current, and mains rated from 200 to 600 amperes, the

new panelboard is offered in two versions: Type TQLP, the panel base assembly without the circuit breakers; and the Type TQLA, the assembled panelboard.

Both versions are specifically designed for General Electric's new 15-50 ampere single, two-, and three-pole Type TQL circuit breakers, which are approximately half the size of the conventional E-frame breaker. By using the compact TQL breakers, the new panelboard is smaller than panelboards using E-frame breakers.

The new plug-in feature, which allows the single-, two-, and three-pole breakers to be arranged in various combinations, means the branch circuits can be altered to meet changing applications.

Sanitary Triplex Pump

C-12 The Votator Division of **The Girdler Company, 224 East Broadway, Louisville, Ky.**, has designed a sanitary triplex pump with basic improvements that solve many problems in the food and chemical fields. It is compact and trouble-free.

The new pump is employed where corrosive slurries of viscosities as high as 40,000 centipoises are handled at medium pressures. One of its chief advantages is that the standard design may be varied to individual service conditions. The materials of construction and the drive may be specified by the customer; plungers may be equipped with packing, cups or "O" rings; a ceramic or special alloys may be used instead of the standard Stellite valve trim; flanged or sanitary connections may be employed, and higher pressures can be accommodated at reduced displacements.

The three single acting cylinders are available with bores of $1\frac{1}{2}$ ", 2", 2 $\frac{1}{2}$ " or 3". The stroke is 2 $\frac{1}{2}$ ". Maximum capacities range from 10 to 30 gpm and maximum pressures from 450 to 1500 psig. Maximum recommended speed is 150 rpm.

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in every shop
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on-the-job locations

Foreign soils disappear and skin ailments and dermatitis are inhibited when you use VI-LAN, the remarkable skin cleanser — powered with Actamer, product of Monsanto Chemical Co. to reduce skin bacteria as much as 97%.

VI-LAN does what soaps or powders can not do. It cleanses and disinfects hands, face and body against skin contaminations. Used WITH OR WITHOUT WATER. It removes greases, oils, paints, tars, acids, printing inks, asphalt, pipe dope, rubber, gasket cement, etc., and protects you against lost man hours and annoying compensation claims. VI-LAN contains lanolin to restore natural skin qualities.

For convenient filling of dispensers VI-LAN comes to you in polyethylene bags, thru which you may dispense as much as is needed without waste.



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New Fittings for Cemented or Solvent-Welded Plastic Pipe

C-13 A thin layer of plastic on part of the inside wall of Uscoweld plastic fittings development by the mechanical goods division, **United States Rubber Co., Rockefeller Center, New York 20, N. Y.**, promises to do away with

Equipment, Supplies & Methods (Cont'd)

the problem of leaks at joints in plastic pipe installations.

The plastic layer, which makes the fitting socket slightly smaller than the pipe fitted into it, is dissolved by solvent cement when the joint is made and the pipe end can be pushed snugly into place. High contact pressure between fitting and pipe end then causes a positive, leak-free welded joint. Weld is strong enough within seconds for ordinary handling.

A range of Uscoweld (styrene-acrylonitrile blend) fittings for standard size pipe from $\frac{1}{2}$ " to 2" in diameter is now being produced. It is a tough lightweight plastic with good corrosion resistance.

For more Free Data CIRCLE CODE NO. on the Handy Return Card — Page 89



Blower Converted Into Industrial Vacuum Cleaner

Used in connection with other available suction attachments the Fangard Attachment No. 226 converts the ACE portable electric blower (The Ace Company, Box 1212, Ocala, Florida) into a limited capacity tank type industrial vacuum cleaner.

With it, nuts, screws, washers, scrap, etc., can be picked up safely, without danger of damaging the fan or fan housing. Portability is important where cleaning is done from ladders, in elevator shafts, etc., places difficult to reach with conventional tank type cleaners.

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All Bunting Sintered Bronze Plain and Flange Bearings are stamped with part number—an exclusive Bunting feature.



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WHERE TO GET IT

And How to Do It

-INDEX OF HELPFUL BOOKLETS, BULLETINS, REFERENCE LITERATURE-



STEAM TURBINES . . . FURNACES BOILERS, STOKERS, BURNERS

2—Stoker — New bulletin describes the type C-C RotoStoker, a spreader stoker that automatically cleans the fuel bed and discharges the ash continuously at the front. Operates without smoke thru wide load range. — DETROIT STOKER COMPANY.

9—Free Coal Counseling — General information on how Coal Bureau engineers will advise on selection, transportation and utilization of the right coal for your purpose. — NORFOLK AND WESTERN RAILWAY.

11—Feedwater Treatment — Bulletin describes liquid and dry (Braxton & Flako) boiler feedwater treatment recommended for removal and prevention of scaling and corrosion during use of many types of water and for prevention of foaming and carryover. — ANDERSON CHEMICAL CO.

14—Generator Installations — Bulletin GB-1 shows how installations of Amesteam Generators have solved boiler room problems for their owners. Photos illustrate units from 10 through 600 hp for firing combinations of oils and gases. — AMES IRON WORKS, INC.

48—Boiler Tubes — Booklet gives information on care of boiler tubes, causes of chemical attack, etc. Contains charts of weights, working pressures, etc., for boiler tubes and pipe. — BOILER TUBE COMPANY OF AMERICA.

61—Ash Removal — Bulletin S-56 shows how costs can be reduced with a National pneumatic steam-operated or motor-driven air exhaust type system. High operating efficiency based on tons of ash handled per pound of steam used. — NATIONAL CONVEYOR COMPANY, INC.

68—Oil Burners for Light or Heavy Oil — Bulletin 65 — Describes National Airoil Type "LAP" oil burners to operate with light or heavy oil under manual or automatic control, using low air pressure for atomization. Wide firing range in each of seven sizes. — NATIONAL AIROIL BURNER COMPANY, INC.

76—Gas Burner — Bulletin — Describes the Rectilinear gas burner, an application of the venturi principle which provides high input through narrow rectangular openings for firing — in a horizontal plane

through fire doors or small openings over handfired coal grates or stokers — or for firing in a vertical plane on either side of stoker or oil burner. — THE WEBSTER ENGINEERING COMPANY.

86—Pulverized Fuel Systems — Bulletin, 29 pages — Gives information based on 50 years' experience in steam generation; well illustrated with cross-sectional drawings and graphs — gives advantages, typical installations, and descriptions of major operating parts. — FOSTER WHEELER CORP.

87—Steam Turbines—Single Stage — Bulletin 500 describes features and characteristics of company's type DH steam turbines in horizontal and vertical models. — DEAN HILL PUMP COMPANY, INC.

89—Solid-Wheel Turbine — Bulletin S-116 gives complete details on Terry solid-wheel turbo-gear units; blades cannot foul; no need for close axial blade clearance. — TERRY STEAM TURBINE COMPANY.

91—Steam Generators — 18 sizes, from 20 to 600 bhp, for pressures to 250 psi, also for hot water. Complete details in Catalog 811F. — SUPERIOR COMBUSTION INDUSTRIES, INC.

98—Blow-Off Valves — Bulletin B-426 describes valves widely used for low and medium pressures. No seat to score, wear, clog or leak. — YARNALL-WARING COMPANY.

FANS—PUMPS—COMPRESSORS HEATERS—HEAT EXCHANGERS

101—Heat Exchangers — Bulletin 1.1K5 describes exchangers widely used on engines, compressors and other machinery for cooling lube oil, jacket water, air and gas. Compact, standardized units in wide range of sizes. — ROSS HEAT EXCHANGER DIVISION.

103—Fire Pumps — Selection charts and "typical" fire pump specifications featured in 36 p Bulletin B-1500. 120 approved pumps tabulated by Underwriters' and Factory Mutual and listed according to types of drive. — PEERLESS PUMP DIVISION.

119—Desuperating Heaters — Bulletin WC-110 — Describes a new development — the package type heater for smaller boiler plants, com-

pletely equipped with all accessories. Flow diagrams, photographs of installations, etc. — GRAVER WATER CONDITIONING CO.

122—Industrial Fans — Bulletin 702A covers type XL Fans having 11" thru 60" inlet diameters, pressures to 18" SP, volumes to 130,000 CFM for industrial air and material handling. — CLARAGE FAN CO.

127—General Fans — Bulletin T-158 — A general catalog — describes company's complete line of fans, including large commercial and industrial type fans designed to properly ventilate plants and other enclosures, and increase morale and efficiency. — THE EMERSON ELECTRIC MFG. CO.

142—Centrifugal Pumps — Full line of single stage horizontally split case centrifugal pumps described in 12 page Bulletin 721.6; capacities 200-6400 gpm; heads up to 260 ft; maximum standardization and interchangeability of parts. — GOULDS PUMPS, INC.

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160—Boiler Feed Pumps — 12 p Bulletin 122 describes and illustrates the type BFI high pressure pumps. Design features, service ratings and engineering data included. — PACIFIC PUMPS, INC.

165—After-Cooler — Bulletin 130 shows how the Aero unit removes moisture from compressed air or gases; cools water for jackets and intercoolers; cools air or gases in both power and process systems; and protects air tools and pneumatic systems from water damage. — NIAGARA BLOWER COMPANY.

172—Pumps — Catalog A-156 covers double-suction, general purpose, single-stage centrifugal pumps for general service wherever liquids of low viscosity are to be moved; low maintenance; sizes up to 10 in. discharge. — C. H. WHEELER MANUFACTURING CO.

**INSTRUMENTS—METERS
CONTROLS—REGULATORS**

221—Boiler Water Level Controls—

Catalog describes exclusive magnetic operating principle. Low water cut-offs (single stage); pump controls; low and high water alarms; and water columns. Complete line 0-900 lb wsp. — MAGNETROL, INC.

222—Pressure Regulators — Catalog

76 — Gives complete detailed information covering applications, operation and specifications of Reducing Valves, Pump Pressure Regulators and Back-Pressure Regulators. Included is simple, practical method for selecting size of regulators. — MASON-NEILAN DIV.

223—Pressure Gauges — Ashcroft

Gauge Catalog, 124 pages — Information on pressure gauges, gauge accessories and gauge engineering, sectionized by product lines, fully indexed, with selector tables for all gauges. Illustrated with photographs and line drawings. — MANNING, MAXWELL & MOORE, INC.

244—Desuperheater — Bulletin 1024

shows how steam assist desuperheater delivers more accurate con-

trol of final steam temperature for process work or auxiliaries. Close control, even at 10 degrees above saturated temperature. Minimum maintenance and long service life. — COPES-VULCAN DIVISION, BLAW-KNOX COMPANY.

277—Instrumentation — Complete

line of standard instruments described in 8 page short form catalog — automatic oscilloscopes, galvanometers, pressure transducers, strain gage control units, strain indicators, automatic developers and turning forks. — HATHAWAY INSTRUMENT DIV., HAMILTON WATCH COMPANY.

280—Valve Manifolds — Bulletin

56-1 explains how the new Equa-Safe manifolds stop mercury blowing and damage to differential bellows and diaphragms. Give excellent protection to differential pressure type instruments. Can be completely dismantled without breaking any pipe connections and inlet seat can be

dressed up in place. — REPUBLIC FLOW METERS CO.

297—Remote Signal Alarms—Bul-

letin WG-1624 describes how lights on horns, operated by indicator control unit give instant warning of any serious deviation from normal boiler water level. — YARNALL-WARING COMPANY.

**PLANT EQUIPMENT—WELDING
TOOLS—PROCESS SPECIALTIES**

306—Steel Buildings — Catalogs cov-

er Series S buildings (clear span widths from 4-40 ft) featuring Steelox panel construction; and Series P buildings (clear-span widths up to 100 ft); fire resistant & weather tight; simplified design eliminates much job-site labor. — ARMCO DRAINAGE & METAL PRODUCTS, INC.

307—Condensate Drainage Control—

Publication 6025 describes units

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226	244	277	280	297	306	307	310	315	340	349	351
370	402	403	410	422	425	430	432	437	439	443	475
487	500	504	513	546	552	596	624	626	631	639	643
652	694	696	710	712	713	714	715	717	721	728	745
754	755	784	831	852	855	871	884	0-1	0-2	0-3	0-4
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for improving quality of heat transfer in process equipment through continuous return of condensate to boiler at high temperature and pressure. Lists many cases substantiating claim for increased heat transfer, more production with less fuel. — COCHRANE CORPORATION.

310—Compressor Troubles — Bulletin PC-509 P helps locate and correct common air-cooled and water-cooled compressor troubles. — WORTHINGTON CORPORATION.

315—Pressure Vessels — Catalog 100 discusses your plate fabrication problems and shows how company custom-fabricsates hot water storage heaters, tanks, air receivers, blow-off tanks, etc. Corrosion resistant linings and materials featured. Suggested specifications and other valuable technical data given. — J. J. FINNIGAN CO.

340—Infra-Radiant Heater — Bulletin describes Panelbloc heaters

for heating where natural gas, manufactured or LP is available. Economically installed units need no electrical connection, no fans, motors or moving parts; automatic noise-free operation. — THERMOBLOC DIV., PRAT-DANIEL CORP.

349—Stainless Steel Floor Grating — Catalog contains table of safe loads, properties of stainless steels, other valuable engineering data and how to order. — KERRIGAN IRON WORKS, INC.

351—Steel Grating & Treads — Bulletin 2486 describes electroforged steel grating and treads, their advantages and typical successful applications. — BLAW-KNOX EQUIPMENT DIVISION, BLAW-KNOX COMPANY.

370—Welding Rod Guide — 32 page DirectoRod Guide helps you select from 160 rods those that will give you the largest savings per job,

whether production, maintenance or salvage. — EUTECTIC WELDING ALLOYS CORP.

**PIPING, VALVES, FITTINGS
STEAM SPECIALTIES, TRAPS**

402—Forged Steel Valves — 32 page supplement of Catalog F-9 covers new general purpose gate, globe and angle valves for 150-800 lb service. Featuring hard faced seating surfaces. — HENRY VOGT MACHINE CO.

403—Valve Operators — Folder shows how re-designed sprocket rim makes any valve readily accessible from the floor. Simplifies pipe layouts, prevents accidents, fits all valve wheels. — BABBITT STEAM SPECIALTY CO.

410—Piping Insulation Manual — "Technical Data Manual," 20 p booklet, gives engineers all available information on the application of Gilsulate, a new insulation for underground hot pipes. Describes three grades, how to determine ditch size for various pipes and types of soil, and gives sample problems. — AMERICAN GILSONITE COMPANY.

422—Motor Pump — Liquid handling applications described in general bulletin. Sizes from $\frac{1}{4}$ to 75 hp, 5 to 2800 gpm with heads to 650 ft. — INGERSOLL-RAND.

425—Steam Trap with only three parts — cap, disc and body described in Bulletin 257. No valve closing mechanisms. Only moving part is solid stainless steel disc. Same trap for all loads and pressures 10-600 psi. — SARCO COMPANY, INC.

430—Check Valve — Catalog 30A highlights the "tilting disc" check valve for handling fluids or gases under wide range of pressures. — THE CHAPMAN VALVE MFG. CO.

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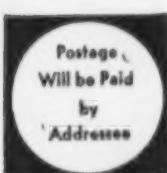
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432—Aluminum Jacketing — Data sheets describe low first-cost, long life jacketing for weather-proofing of insulated lines, towers, vessels and tanks. Lap-seal design feature makes more positive weather seal. — CHILDERERS MANUFACTURING COMPANY.

437—Piping For Permanence — Bulletin covers a variety of services where wrought iron pipe saves because it serves longer. Corrosion costs you more than wrought iron. — A. M. BYERS COMPANY.

439—Self-Cleaning Strainers — Bulletin 5308 describes units to protect all regulating equipment from dirt and foreign matter; liquid, gas, oil and steam services; sizes $\frac{1}{2}$ " to 10" inclusive; primary service ratings to 2500 psi. — LESLIE CO.

443—PVC Fittings & Flanges — Corrosion resistant polyvinyl chloride pipe fittings & flanges covered in 12 p catalog, featuring characteristics, advantages, limitations, operating pressures, temperatures, field tests, etc.—GRINNELL COMPANY, INC.

475—Chrome Alloy Pipe & Tubing — No. 620 stock list tabulates available low chrome alloy pipe and tubing for high temperature use. — MIDCONTINENT TUBE SERVICE, INC.

487—Plastic Valves — 6 p circular illustrates new Luncor valves and fittings. All-moulded corrosion-resistant PVC valves made to handle wide range of acids and alkalis and to resist chemical attack and deterioration. — THE LUNKENHEIMER CO.

MAINTENANCE PACKING GASKETS, LUBRICATION

500—Liquid Separator Filter — Catalog describes Fram Space-Saver Units, for removing water from liquid hydrocarbons by filtration. Units engineered for easy installation and maintenance and are designed for a wide variety of applications — up to 69 gpm. — WARNER LEWIS COMPANY.

504—Bearing Stock — Catalog No. 52 describes cast bronze bearing, bars and special parts. Gives engineering data. — THE BUNTING BRASS & BRONZE COMPANY.

513—Conveyor Belt Repairs — Bulletin R-700 and Folder R-4 describe the "Rema" method of making vulcanized repairs without heat. Holes, gouges, rips and tears can be repaired on the job. Curing time delay is eliminated. Belts can be put into service immediately after repair is made.—FLEXIBLE STEEL LACING COMPANY.

546—Metal Packings — Brochure 3889 describes split-case metal packings for air compressors, which can be installed without disconnecting rod. Minimum life of 7 years with proper lubrication. — GAR-LOCK PACKING CO.

552—Packing Removal Tool — Bulletin DHSP describes the Dura Hook that "works around corners" for removing old packing from stuffing boxes.—DURAMETALLIC CORPORATION.

596—Tube Cleaners & Expanders — Catalog 77 covers tubes in high pressure boilers, superheaters, economizers and other heat exchange equipment. Model 38 expander rolls and flares in single operation. — THOMAS C. WILSON, INC.

ENGINES, DRIVES POWER TRANSMISSION MATERIALS HANDLING

624—Freight Elevators — Booklet A-414 describes the new Plunger Electric Freight Elevator designed for low-rise, light and heavy duty freight handling requirements. — OTIS ELEVATOR COMPANY.

626—Personnel Elevators — Industrial personnel elevators, available in 1, 2, and 4 passenger sizes (300-1000 lb capacity), described in Catalog 5A-156. Gives specifications and dimensional layouts. — J. B. EHRSAM & SONS MFG. CO.

KEEP UP-TO-DATE USE SPI READER SERVICE

631—Screw Conveyors — Catalog ID-541, 68 pages — Illustrates and describes standard and special types of conveyors, with engineering data necessary for selection. Tables give sizes, types, speed, horsepower and other information. Accessories included. — CONTINENTAL GIN COMPANY, INDUSTRIAL DIVISION.

639—Mechanical Aerial Ladder — 4-page catalog, describing features of Holan Series 2200 ladder, features new band-type brake, duo-level platform and rung construction.—J. H. HOLAN CORPORATION.

643—Automatic Monorail Transportation — Bulletin AD-1A, 12 pages — Describes a complete range of automatic dispatch monorail systems for transfer of materials by remote control.—AMERICAN MONORAIL CO.

652—Bridge Drive — Catalog 376F describes Budgit bridge drive which converts bridge travel of hand operated cranes to electric drive. No drilling or machine work—one hour conversion time. — SHAW-BOX CRANE & HOIST DIVISION.

654—Stock Roller Chains and Sprockets — Catalog No. 754, 66 pages — Describes and illustrates Stock roller chains and sprockets including minimum and finished bore,

ready-to-use TaperLock bushed sprockets, as well as chain selection and application data. — DIAMOND CHAIN COMPANY, INC.

696—Belt Manlifts — Catalog 5A-156 describes 3 sizes of belt-type manlifts for simultaneous traffic in both directions for plant personnel. Comply with A.S.S. Code requirements. — J. B. EHRSAM & SONS MFG. CO.

WATER TREATMENT, HEATING VENTILATING, AIR CONDITIONING REFRIGERATION, DUST & FUME CONTROL

710—Scale Remover — Bulletin shows how Anco Scale Remover quickly eliminates scale in boilers, water lines, refrigeration and air conditioning systems.—ANDERSON CHEMICAL COMPANY.

712—Ion Exchange Equipment — Bulletin A-255 describes the various methods of ion exchange treatment which provide suitable boiler feedwater, process water, and purified solutions.—ILLINOIS WATER TREATMENT CO.

713—Electric Precipitators — 26 page Bulletin 104 shows how units meet five engineering requirements —Positive control of gas flow; High, uniform electrode emission; Effective continuous cycle rapping; Simple, rugged construction; and Safe, trouble-free high voltage equipment. Gives 9 time-tested steps to a successful installation.—BUELL ENGINEERING COMPANY.

714—Industrial Heaters — Bulletin P-154 — Describes "Panelbloc" infra-red unit heaters available in 62,500 btu and 125,000 btu input. No fan, motor, or electrical connection is needed. Heating is accomplished by guided radiation. The units may be used with any commercial type gas fuel.—THERMOBLOC DIV. OF PRAT-DANIEL CORP.

715—Amine Treatment — Return line corrosion is a critical problem in maintaining economical, efficient power plant operation. Bulletin CP-100 shows how amine treatment is an easy, effective and economical way to eliminate pipe corrosion problems. — THE BIRD ARCHER COMPANY.

717—Water Conditioning — 4 page bulletin describes the company's equipment for all water conditioning problems. Illustrations are included. Includes discussions of hot process softeners, hot zeolite after-treatment, cold process softeners and clarifiers, deaerating heaters, demineralizing and silica removal, sodium and hydrogen zeolite softeners, filters and continuous boiler blowoff. — GRAVER WATER CONDITIONING CO.

721—What Type Collector? — Reprint 102 discusses control of industrial dusts and flyash and features P-D Collector Systems.—THE THERMIX CORPORATION.

(Continued on Next Page)

728—**Demineralization** — 40 page handbook 5800-B compares various methods of water treatment, including evaporators, with demineralizers. Lists characteristics of various types of cation and anion exchange materials; includes technical data, recommends types of units to meet varying conditions. Photos and flow diagrams are shown and installation cases reported.—COCHRANE CORPORATION.

745—**Dust & Fume Control** — 40p booklet gives helpful information on recovering dusts, fly ash, mists, fumes and other suspensions of gases. Summarizes important points design and plant engineers should know about electrical precipitators.—WESTERN PRECIPITATION CORPORATION.

754—**Power Roof Ventilators** — 8 page Bulletin 3904 describes 16 sizes of up-blast type units; 21 sizes of hood type exhaust units; and 20 sizes of hood type supply units. Fan speeds and motor hp included.—AMERICAN BLOWER CORP.

755—**Cooling Tower**—Bulletin DVAQ describes the double-flow Aquatower for industrial services involving intermediate galleonages. Space saving line in wood or steel structure with asbestos cement board casing, in single or multi-cell units.—THE MARLEY COMPANY.

784—**Refrigeration Valves and Fittings**—Catalog 0, 40 pages—De-

scribes valves and fittings for ammonia, Freon and other refrigerants, for use in industrial refrigeration, ice making and air conditioning.—FRICK CO.

ELECTRICAL

831—**Electric Heating Cable**—Bulletin F-1527 — Describes "Thermowire," a low cost, easily applied flexible electric heating cable, a versatile new product with many uses and applications in industrial and commercial processing.—EDWIN L. WIEGAND CO.

652—**Autotransformer Starter**—with air break contacts up to 75 hp, 220 v; 150 hp, 440-550 v is described in Bulletin 646. Silver alloy contacts stay in good condition without filing, cleaning or dressing. — ALLEN-BRADLEY.

855—**Wiring Analyzer**—4 page bulletin describes Model 301 Adequate Wiring Analyzer which quickly, simply and easily tests wiring without confusing calculators or slide rules.—SPRAGUE ELECTRIC COMPANY.

871—**Electrical Protection — Protection Handbook** — Tells how to protect motors, apparatus and circuits. Gives National Electrical Code requirements in simplified form. Designed to help the electrical or plant maintenance engineer. — BUSSMANN MFG. CO.

884—**Portable Cords**—Bulletin covers complete new line—Securityflex cords for severest application; Industrial "all-purpose" cords for hard usage; and Service cords for shop appliances. — ANACONDA WIRE & CABLE COMPANY.

MISCELLANEOUS

0-1—**Metal Removal**—4 page Bulletin No. 6-1 features numerous new applications for the Arcair Torch for the cutting, gouging, beveling or grooving of all metals. Includes data on Arcair electrodes.—ARCAIR COMPANY, 419 S. Mt. Pleasant St., Lancaster, Ohio.

0-2—**Compressor Needs & Air Consumption**—Bulletin AC-15 gives two handy charts, one for figuring compressor needs and another showing estimated free air consumption for 30 common shop jobs.—GARDNER-DENVER COMPANY, Quincy, Ill.

0-3—**Lift Truck Operation**—24 page booklet "How to Operate a Lift Truck" gives information about the operation of a lift truck, preventive maintenance, safety and basic materials handling. Slanted for both the beginner and the experienced operator. Gives drawings for setting up an obstacle course.—HYSTER COMPANY, 2902 N. E. Clackamas St., Portland 8, Oregon.

0-4—**Steam Generator** — 12 page Booklet No. 586 describes the Modular Steam Generator which gives steam for heating, power or processing. Clean, quiet, and follows fluctuating load up or down with unmatched speed and accuracy.—VAPOR HEATING CORPORATION, 80 E. Jackson Blvd., Chicago 4, Ill.

0-5—**Industrial Pumps**—Illustrated Bulletin 1100 contains table for determining hp, capacity and head for vertical pumps. Also includes sectional views, material specifications, schematic application drawings, and photos of installations.—LAYNE & BOWLER PUMP CO., 2943 South Vail Ave., Los Angeles 22, Calif.

0-6—**Variable Pitch Drives** — Catalog V-183-A illustrates and describes company's line of Variable Pitch Drives which are designed for use with standard "B" and "C" Section Gripbelts and "B" and "C" stock driven sheaves. Gives complete specifications, engineering information and tables of practical stock drive combinations for easy selection. — BROWNING MANUFACTURING CO., Maysville, Ky.

For more Free Data CIRCLE CODE NO. on the Handy Return Card — Page 89

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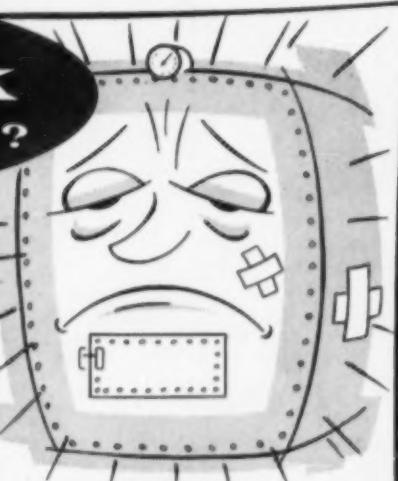
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Kincaid Engineering Co., Gastonia, N.C.
J. L. Goodman & Son, Hickory, N.C.
Summers Hdwe. & Supply Co., Johnson City, Tenn.
McBurney Stoker & Equip. Co., Atlanta, Ga.
Brown-Rogers-Dixon Co., Spartanburg, S.C.
Applied Engineering Co., Orangeburg, S.C.

DEALERS IN MOST TOWNS AND CITIES



News (Continued)

Starts Page 10

Swartwout—Houston

Appointments of R. L. Broderick as Houston District Manager for the Autronic Process Controls Division has been announced by The Swartwout Company, Cleveland, Ohio. J. B. Downey will continue as Regional Product Manager for the entire Southwest. The Swartwout Company headquarters for the Southwestern district are located at 858 M & M Building, Houston 2, Texas.



R. L. Broderick

Mr. Broderick has been associated with The Swartwout Company for several years in the Cleveland plant, most recently as project engineer of the Autronic Process Controls Division and previously as application engineer in the Power Plant Equipment Division. Prior to joining Swartwout, he was with the Lewis Flight Propulsion Laboratory of the National Advisory Committee for Aeronautics as a research scientist.

Mr. Broderick was graduated from Case Institute of Technology, Cleveland, in 1952 as a B.S.M.E., and attended John Carroll University. He served in the USAF as a pilot with the 15th Air Force in Italy and was discharged with the rank of 1st lieutenant.

Federal Pacific—Washington

John Chickering, formerly applications engineer for the New York City Industrial Division, has been appointed branch manager for Federal Pacific Electric Co. sales in the Washington, D. C. area, according to an announcement by H. E. Knudson, Middle Atlantic sales manager.

ARE YOU RESPONSIBLE FOR MEASUREMENT OF FLUID FLOW?

Gentile*

FLOW TUBES

are impact-type head meters or differential producers.

They are designed to give you guaranteed high accuracy with lowest head loss.

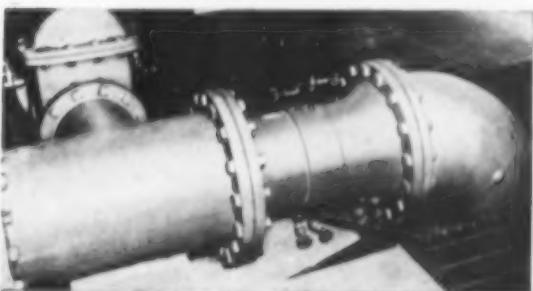
You also get:

LOW FIRST COST—Gentile Flow Tubes are economical to purchase.

LOW OPERATING COST—Gentile Flow Tubes require minimum maintenance. Where purging or back-flushing is a normal routine, the Gentile Flow Tube can be arranged for constant or intermittent purging without removing from the line.

LOW INSTALLATION COST—Gentile Flow Tubes can be installed with no straight run upstream or downstream, except where near valves or regulators.

Actual installation of a 16" Flow Tube for REVERSE FLOW. Note fittings (elbow and tee) are bolted directly to flanges of Flow Tube.



Gentile Flow Tubes can be furnished with or without suitable secondary indicating, recording, or totalizing instruments.

GENTILE Flow Tubes are manufactured exclusively by Foster Engineering Co.

Write for further information or specific recommendations.



FOSTER ENGINEERING COMPANY

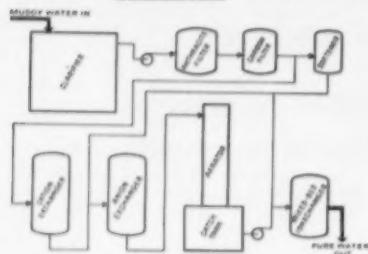
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AUTOMATIC VALVES • CONTROL VALVES • SAFETY VALVES • FLOW TUBES

ILLCO-WAY

ionXchange

HIGH-PRESSURE BOILERS NEED PUREST WATER



An ILLCO-WAY System, incorporating up-to-date ionXchange equipment, offers the best opportunity available today for obtaining the high-purity water that modern high-pressure boilers *must* have to avoid serious loss of operating efficiency. Such a System will take the muddiest kind of hard river water and clean it up so that suspended impurities, mineral content, and dissolved solids are reduced to almost unmeasurable quantities. The result — top boiler performance, always, and top *tur*-bine performance.

ONE SOURCE FOR THE WHOLE SYSTEM

Today, such a System can be obtained, *complete*, from a single source — Illinois Water Treatment Company. We design and manufacture every element to solve successfully the particular application. You do not need to combine a part from here and a portion from there — you get it *all* from us, all tanks, all piping, all valves and controls, all resins and other materials, all carefully selected to suit your needs. *Consult our experienced engineers at the next opportunity...*

ionXchange

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News for the South & Southwest (Continued)



Reactor Simulator Aids Training

Model Reactor — V.P.I.

An electronically-controlled model reactor, which precisely imitates the behavior of an actual reactor, is now in use for training and research. Known as a nuclear reactor simulator, the device is the latest means to help reduce the critical shortage of trained nuclear scientists and engineers and to facilitate research on industrial applications of atomic energy.

The nuclear reactor simulator is in operation at the atomic energy laboratory of **Virginia Polytechnic Institute** where 20 graduate engineers are taking a newly-inaugurated course in nuclear engineering. It is the first equipment of its kind to be installed in any educational institution. Developed by **Leeds and Northrup Co.**, Philadelphia manufacturer of automatic instruments

and controls, the simulator consists essentially of an electronic analog computer, a control console, and a model of a reactor core. The computer continuously solves the differential equations that represent the kinetic operation of a nuclear reactor. The control rods in the model core respond to the signals from the computer so that the operator can see the effects of his control actions.

The V.P.I. simulator is similar to a unit which **L&N** built last year for **A.E.C.** use at the "Atoms for Peace" Conference at Geneva, Switzerland. Along with a newly-built natural uranium exponential reactor, the simulator at V.P.I. is being used for training graduate engineers in nuclear theory and operation as well as for many kinds of research for all industries interested in atomic energy.

Kaiser's \$200 Million W. Va. Aluminum Works in Production

The first aluminum sheet to come from the nation's newest aluminum production center is rolling out from the initial operating units of the \$200-million works **Kaiser Aluminum & Chemical Corporation** at **Ravenswood, West Virginia**.

Production of common alloy coiled and flat aluminum sheet is just the start of the great flow of aluminum products to be produced—primary aluminum and sheet, plate and foil in a variety of forms.

In the Ravenswood Works Kaiser Aluminum is constructing two plants, each a great facility in its own right. They are laid out on the 2500-acre site to provide maximum efficiency in an integrated operation in which molten primary aluminum produced from alumina in the reduction plant will be cast directly into ingots for the adjacent rolling mill.

When completed, the rolling mill will have an annual capacity of 169,150 tons of fabricated products. The reduction plant initially will have four potlines with an annual capacity of 125,000 tons of primary aluminum, and enlargement to a capacity of 220,000 tons is contemplated as the aluminum market warrants.

Construction of these two facilities has set the pace in the aluminum industry's move to the Ohio Valley.

Uses Coal-Based Power

"There is a special significance in Kaiser Aluminum's Ravenswood Works," D. A. Rhoades, vice president and general manager, declared in commenting on the start of sheet production.

"It will be the first operation in the U. S. aluminum industry based on the fact that coal is the most economic source of electrical energy for the production of aluminum when located close to major markets and a direct transportation route for raw materials.

"Recognition of this fact led Kaiser Aluminum to the Ohio River Valley site at Ravenswood — where low-cost coal-based power is readily available, where 70% of the nation's aluminum consumption is within a 500-mile radius and where the company is able to move materials from mine to fabricating plant in a direct line over a short all-water route.

Upon completion in 1958, the Ravenswood Works will provide employment for some 4000 workers.



Open Drip Proof, Totally Enclosed Fan Cooled, Totally Enclosed Non-Ventilated, NEMA "C" and "D" Flange, Extended Shaft Pump Motors, Special Motors, stocked in a wide range of sizes.

FAST DELIVERY OF ALL POPULAR MODELS

Brook Motors are available from warehouses at Chicago, Dallas, Jersey City, Los Angeles, Memphis, St. Paul, Salt Lake City, San Francisco, Savannah, Seattle, Tampa and other major distributing points.

BROOK MOTOR CORPORATION
3553 W. PETERSON AVE., CHICAGO 45, ILL.



18



No matter what your need, B.T.A. carries the most complete stocks of boiler tube sizes and gauges... for any make of boiler. No need

for you to stock... you can have spares when you need them... fast! 'Phone or wire!

Specialty Bending for any need

BOILER TUBE CO. OF AMERICA

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Electric Power Drive Systems are important factors in determining the productivity and flexibility of any manufacturing process. To help you successfully compete with the trend toward mechanization and automation, Sterling offers a wide range of power transmission equipment—variable speed or constant speed—with manual or automatic controls. These products, plus Sterling's Application Engineering Service, give your machinery the type of drive system that assures versatility and maximum productivity at lower cost.

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ELECTRIC MOTORS
LOS ANGELES 22 • CHICAGO 35
CINCINNATI 37 • NEW YORK 51

M S & D—Maryland

Maryland Shipbuilding & Drydock Company has announced that **J. Robert Dougherty** has joined the Heat Transfer Design Engineering staff of the Company's Industrial Products Division.

Mr. Dougherty is a graduate of the University of Maryland from which he received his B.S. and M.S. degrees in Mechanical Engineering.

Prior to his association with Maryland, Mr. Dougherty was associated with the Air Preheater Corporation and the Baldwin-Lima-Hamilton Corporation.

Fairbanks—South

James L. Ragland, Manager of the Southern Branch Office and Warehouse of **The Fairbanks Company**, has announced the appointment of a new salesman, **Joseph A. Bailey**. Mr. Bailey will sell the com-



plete Fairbanks line—Bronze and Iron Body Valves, Casters and Wheels, Two Wheel and Platform Hand Trucks and Dart Unions—in Louisiana, Southern Mississippi and the Mobile and Pensacola Trading Area. He brings twelve years of sales experience on mechanical equipment, for Tropical Ice and Cold Storage Company of New Orleans, to his new position with The Fairbanks Company.

New Engineering Mgr. for Anderson Electric—Ala.

Anderson Electric Corporation, Birmingham, Alabama, one of the country's largest manufacturers of bronze and aluminum connectors, clamps, fittings, and accessories for the electrical power industry, has

announced the appointment of **Kenneth A. Fleck** as Engineering Manager. Mr. Fleck was formerly connected with Moloney Electric Company of St. Louis, Missouri.

Ft. Worth Steel—Oklahoma

Oklahoma is the latest state to gain a factory branch warehouse and sales office of **Fort Worth Steel & Machinery Company**, manufacturer of mechanical power-transmission equipment and bulk-materials-handling machinery.

The new branch is located in Oklahoma City at 1413 West Reno Street. The 39-year-old Fort Worth, Texas, firm's nationwide distribution system includes similar facilities strategically located in a dozen other market centers.

The new branch warehouse, supervised by District Sales Engineer **F. H. (Hap) Apperson**, serves independent distributors of "Fort Worth" products throughout Oklahoma and part of the Texas panhandle.

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News (Continued)



Claude Huey & Paul Yopp

B & W—Atlanta

Claude L. Huey has been appointed manager of The Babcock & Wilcox Company's Atlanta District. He succeeds **Paul R. Yopp**, who retired in January after serving as Atlanta District manager for 31 years.

Mr. Huey, born in Birmingham, Ala., joined B&W in 1930 as a student engineer at the former Bayonne, N. J., Works. He was transferred to the Barberton, Ohio, Works the following year and worked in the production department and the process equipment division before returning to Atlanta as a sales engineer in 1934. During his long tenure in this position, he negotiated many large contracts for B&W throughout the district. A few of the more recent contracts were those with Florida Power & Light Co., Georgia Power Company, Alabama Power Company, Florida Power Corporation and the Tampa Electric Company.

A graduate of Georgia Tech, Mr. Huey is a registered engineer in Georgia, and is a member of both the Georgia Engineering Society and the Florida Engineering Society. A member of the American Society of Mechanical Engineers, he is a past chairman of Region No. 4 (Atlanta), and a former secretary of the ASME national nominating committee.

Mr. Yopp's retirement terminates the longest service period achieved by a B&W district manager or Atlanta District employee. He was born in Washington, Ga., and joined B&W in 1921 as a salesman in Atlanta, and was promoted to district manager on Jan. 1, 1926.

A graduate of Georgia Tech and a registered engineer in Georgia, Mr. Yopp is a member of Pi Tau Sigma, an honorary engineering fraternity; the Georgia Engineering Society, and is a past vice president of ASME's Region No. 4.

Southern Engineering's Charles Briley Honored

Charles N. Briley, vice president of the **Southern Engineering Co.**, Charlotte, N. C., was recently named Charlotte's "Young Man of the Year" and presented the Junior Chamber of Commerce Distinguished Service Award.

The Greenville, N. C., native and graduate of the University of North Carolina, served as President of the Charlotte Jaycees and is also a national director of the United States Junior Chamber of Commerce.

Southern Engineering fabricates and erects all types of special steel work — storage tanks, vats, towers, etc.

Westinghouse Breaks Ground for Ga. Transformer Plant

Chairman and President **Gwynn A. Price** and the Westinghouse Electric Corporation's Board of Directors attended ground-breaking ceremonies for the Company's new transformer plant at Athens, Ga., in late February.

When in full production the new Athens plant of Westinghouse will employ approximately 1,200 persons in the manufacture of distribution transformers. The multi-million-dollar installation will double the Company's present capacity to produce pole-type transformers. It will use the most advanced manufacturing techniques and modern equipment and will be situated on a 238-acre tract just north of the Athens city limits.

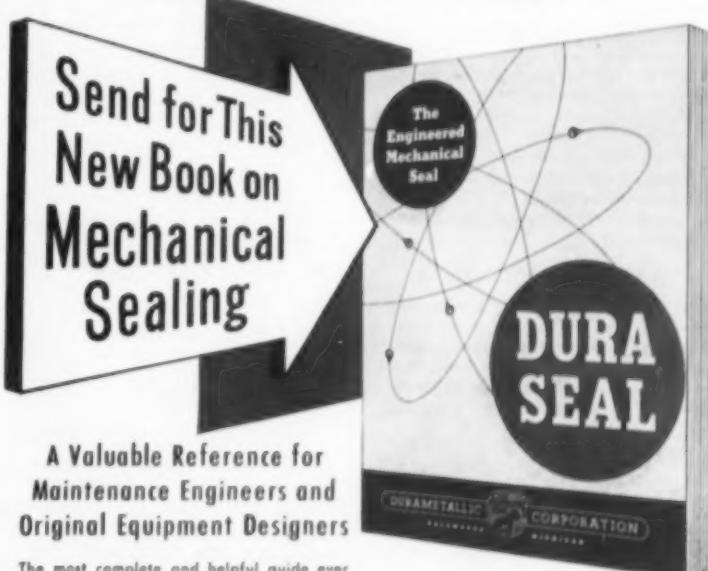
Manager of the new Athens plant will be **Gordon C. Hurlbert**, who is manager of the distribution transformer department. First production at the Athens plant will begin about mid-1958.

Otis O. Rae is the Westinghouse Vice President in charge of the Company southeastern region.

Philip Carey—Memphis

The Philip Carey Mfg. Company, manufacturers of a wide line of materials for building and industry, has opened a new district office at 1510 Orenda Rd., **Memphis, Tennessee**. **W. B. Ott** is District Manager.

JUST OFF THE PRESS!



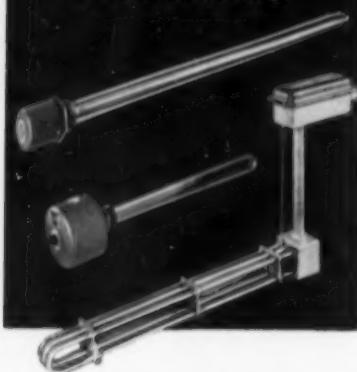
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**LeTourneau Re-enters Earth Moving Field;
New Trade Mark for Texas Based Operations**

Robert G. LeTourneau, who recently announced plans to re-enter the earthmoving field in 1958 after a five-year absence, takes charge at a "christening" ceremony for the new "AR-GEE" trade mark his multi-million dollar company has adopted. Louis A. Flora, advertising manager (left), said the name was chosen to represent initials of Mr. LeTourneau. Others taking part in the ceremony at company headquarters in Longview, Texas, are R. L. LeTourneau, vice president, and F. G. Evangelist, sales manager.

Four years ago, LeTourneau sold his earthmoving business to Westinghouse Air Brake Co. for \$31 million with the agreement that his firm would refrain from building and selling earthmoving equipment for a period of five years, ending May 1, 1958.

Firm's headquarters were then moved to a 12,000 acre plant site near **Longview Texas**. Since then the company, with some 900 employees, has been developing gigantic ultra-powerful equipment for land clearing, off-road transportation, logging, heavy materials handling, offshore drilling, and other fields not related to earthmoving.

LeTourneau all-electric power-rotated jib cranes in 6 to 15 ton capacities are extensively used throughout the South & Southwest. These and other manufacturing activities will be continued. Re-entry into earthmoving will be handled as an enlargement of the company's present program.

Flodar—Southeast

Sales Manager H. J. Enders of the **Flodar Corporation**, well-known pipe and hydraulic fittings manufacturer, announces the appointment of **J. A. Postell** of Atlanta, Ga. to represent the corporation in the southeastern section. A complete warehouse stock will be maintained in Atlanta by the new distributor.

At the same time, the **Clem Weston Company** of New Orleans was named distributor to cover the tri-state area of **Mississippi, Louisiana and Arkansas**, with warehouse stocks in both New Orleans and Shreveport.

Yale & Towne—South

Richard H. Marsh has been appointed southern regional sales manager of Yale Materials Handling Division, **The Yale & Towne Manufacturing Company**.

Previously sales manager of Yale Worksaver and Warehouser sales, Marsh will now supervise Yale sales and service activities of both industrial lift trucks and hoists in **Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee and Texas**. His headquarters will be in Atlanta, Georgia.

News for the South & Southwest (Continued)

Rawson & Co.—Sls. Engr.

The appointment of **Robert E. Moore** as a sales engineer has been announced by **Rawson & Co.** of Houston, Texas.



Mr. Moore, 30, was graduated from the University of Illinois in 1949, receiving a B.S. degree in Chemical Engineering, with honors. He was with the Shell Chemical Corporation at Houston for 7 years, serving in the Technological and Operating Departments. The last two years Mr. Moore was an assistant department manager.

Rawson & Co. operates in **Texas** and **Louisiana** and represents Petro-Chem Isoflow Furnaces, Stratco Contractors and Flash Evaporators, Ducon Cyclones, Brodie Meters, United States Gauges, and other equipment for the Petro Chemical Industries.

Their office and warehouse is at 1223 Waugh Drive, Houston.

Alco Completes \$2 Million Beaumont, Texas Expansion

The completion of a \$2-million building and expansion program at its Beaumont, Texas plant was announced recently by **Alco Products, Inc.** The remodeled plant will boost substantially production of heat exchangers and oil field equipment.

Alco now has one of the most modern and efficient plants to manufacture specialty items and to mass produce heat exchangers and well-control equipment, according to plant manager **C. H. Homer, Jr.** Repair facilities also are provided as are large warehouse areas to stock

both products turned out in Beaumont and those from other Alco plants.

The building and expansion program touched all parts of the plant. On recently acquired property north of the original facilities, Alco constructed a 6,000 sq ft office building backed by a 14,000 sq ft warehouse.

Alco has completely revamped its fabrication, assembly and machine shop facilities. Features of the 25,000 sq ft fabrication and welding department include a new 30 ft stress-relieving furnace and a plate-bending roll with a capacity of one-inch thickness and 20 ft length for the production of heat exchangers.

The machine department, which contains 20,000 sq ft, has been equipped with the most up-to-date machine tools, many of them being of the automatic type. These include vertical boring mills, horizontal boring and milling machines, radial drill presses, turret lathes, grinders and various types of shapers and lathes.

Other departments include the heat exchanger assembly department, fin tube manufacturing, inspection, and tool room.

ASR—Louisville

Construction is under way on a \$3,000,000 addition to **American Synthetic Rubber Company's** Louisville, Kentucky, manufacturing plant, it was announced recently by Bancroft Henderson, president.

Designed, engineered, and constructed by the Southwest Division, Walter Kidde Constructors, Inc., engineers and builders of New York and Houston, the addition will increase existing facilities at the Louisville plant by 50 per cent. Completion is forecast for January, 1957.

Three major structures constitute the expansion project: a 10,500 sq ft reactor building, a three-story recovery building, totaling 8,000 sq ft, and a 12,900 sq ft finishing building. The reactor building will contain twelve new reactors for processing cold rubber, three blow-down tanks and an off-grade latex tank, together with necessary charging equipment and additive facilities. Included in the current project is reconversion

of eight existing cold process reactors to hot process. In the finishing building, three 40,000-gallon tanks will be provided for blending latex.

The latest innovations in synthetic rubber production are being designed into the plant addition, consistent with maintaining production schedules while construction is under way. New controls will be comprehensive and piping arranged for flexibility.

Two 25,000-lb/hr package boilers will be added to provide steam at 175 lb pressure for the new facilities. Two new 30,000-gallon butadiene blend tanks, together with a new purification system, transfer pumps and other facilities will be installed in the tank farm. Tanks will be provided with a deluge type fire protection system.

Ammonia cooling facilities will be increased by the addition of three evaporate ammonia condensers, plus a new liquid ammonia receiver and other required facilities.

Additional plant units will require replacement of the main 13.8-kv electrical feeder and a new substation and motor control center in the finishing building.

The entire plant will be protected by a sprinkler system. An emergency lighting system is also being installed.

Baker-Raulang—Dallas

The **Dallas, Texas**, branch office of the **Baker-Raulang Company** has been moved to a new building at 1703 Levee Street, Dallas 7. The new location provides complete facilities for stocking of parts, and servicing and demonstration of Baker's complete line of gas and electric fork trucks, crane trucks, platform trucks, and the unique Traveloader side-loading fork truck.



Baker-Raulang has also announced the appointment of **M. S. Stevenson**, formerly a district sales manager, as manager of the Dallas branch.

News for the South & Southwest (Continued)

Turbine-Generator for Orlando Utilities

Orlando Utilities Commission of Orlando, Fla., has ordered two gas turbine-generator sets with a combined capacity of 33,000 kilowatts from General Electric Company's Gas Turbine Department in Schenectady, N. Y.

This application is the largest known usage of gas turbines for peak power generation in the United States, according to John P. Keller, department general manager.

The gas turbines, which are each rated at 16,500 kw, are of the simple-cycle, single-shaft design with an inlet temperature rating of 80 F.

The units are designed for dual fuel operation—burning either distillate oil or natural gas.

The first unit is scheduled to be shipped in July, 1957, and the second one in October, 1957. They will both be installed in the Commission's Municipal Power Station.

L.O.F. Glass—Houston

Eugene Sinnott has been named Plant Manager of the Corrulux Division of the L.O.F. Glass Fibers Company.

Corrulux Division, with general offices and factory at Houston, Texas, manufactures glass reinforced plastic panels for the building industry.

Mr. Sinnott, formerly Plant Production Superintendent at the L.O.F. Glass Fibers plant in Parkersburg, West Virginia, has a record of over 30 years in the glass industry.

Wilton Tool—Southeast

The Cameron & Barkley Company has been appointed authorized distributor for the Wilton tool line of manually operated and power vises and clamping tools in Florida and the coastal areas of South Carolina and Georgia.

The Wilton Tool Mfg. Co. offers quality powered vises for bench and machine work; powered set-up clamps which replace conventional bolts and nuts; and powered locking rams for drill-press and bench work applications.

Adequate stocks will be carried in all six Cambar branches in Charleston, S. C., Savannah, Ga., Jacksonville, Tampa, Orlando and Miami, Florida.

Yale & Towne—St. Louis

Ralph W. Worsey, Jr., for the past four years a Yale hoist sales representative in Chicago, has been promoted to District Sales Manager for Yale hoisting equipment in St. Louis.

He replaces **William C. Ruland** who was transferred to the Yale Hoist sales territory centered in Detroit.

Eggelhof Engineers—Dallas

Wilson A. Green has been appointed District Manager of **Eggelhof Engineers, Inc.**, Dallas, Texas. Prior to his recent appointment, Mr. Green was a sales engineer in the company's Houston office. He is a mechanical engineering graduate of Rice Institute.



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OF MORE DEPENDABLE POWER
and at less cost per pound of steam

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Eggelhof Engineers serve Southern and Southwestern industry through offices in Houston, Dallas, Shreveport, San Antonio, Tulsa, Lubbock and New Orleans. The company represents the following leading manufacturers: American District Steam Company, Clark Mfg. Co., Cuno Engineering Corp., Fulton Sylphon and Fielden Instrument Divisions of Robertshaw-Fulton Controls Co., Fred H. Schaub Engineering Co., Titusville Iron Works Co., and the John Zink Co.



Roy Reierson & Dwight Ketting

Flori-Houston Pipe & Steel — St. Louis and Houston

Greatly expanded pipe fabrication facilities resulted from the recent merger of **Houston Pipe & Steel, Inc.**, with the **Flori Pipe Co.** of St. Louis as a combined operation of their parent company, the **Sparton Corporation** of Jackson, Michigan. Several personnel advancements have been announced.

Roy W. Reierson is vice president of the pipe fabrication combine and general manager of the Houston plant. Mr. Reierson will headquartered in Houston while the general offices of the combination will be at the **Flori** office in St. Louis.

Dwight Ketting has been appointed plant manager of the St. Louis works. He was formerly manager of the engineering sales department.

Paul D. Broussard of Houston now represents the company as district sales manager for the Houston area.

J. F. Huitt is chief engineer operating from the general headquarters in St. Louis. He was formerly manager of engineering sales and later production manager.

Herman C. Heink is midwest district sales representative in St. Louis and **Kenneth Notvest** chief research engineer.

Cooper-Bessemer—Southeast

Robert J. Reed has been named **Florida** and **Georgia** sales and service representative by **Charles G. Cooper**, Vice-President and District Sales Manager of **Cooper-Bessemer Corp.**

Mr. Reed previously was a supervising erector in the Service Department having first become associated with the **Cooper-Bessemer Corporation** in 1938.

In his new position, with headquarters in Orlando, Fla., Mr. Reed will be responsible for customer installation service, inspection and repair service, including spare parts sales for engines and compressors.

Thor Power Tool—Virginia

A new branch office of the **Thor Power Tool Company** (portable air and electric power tools) has been opened at 2024 Chamberlayne Ave., **Richmond, Virginia**, to serve most of Virginia, the southern part of West Virginia, and all of North Carolina. **Kenneth V. Bennett**, who has been Philadelphia district service engineer, is the manager of the new branch.

C & D Batteries—Atlanta

Mark C. Pope Associates, Atlanta sales representatives for **C & D Batteries**, have added **Eugene L. Krauss** to the staff. Krauss comes to C & D following eight years' service with the Storage Battery Division of **Thomas A. Edison, Inc.** He was a district manager for Edison.

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PUMPS
BULLETIN 143



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The heavy gauge chrome alloy nozzle is also standardized on the ROTONETIC and HC DYNETIC units.

This is just another example of Webster's ability to engineer and manufacture a more efficient and economical "tool" for burning gas. In its class no other commercial or industrial burner can compare cost wise with quality.

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- ✓ Utility Plants
- ✓ Large Service Plants

These highlights briefed from SPI's SOUTHERN INDUSTRIAL NEWS SERVICE, a monthly publication issued exclusively to SPI advertisers and their representatives through the South and Southwest.

South Atlantic

Lakeland, Fla. plans \$5,000,000 sewer project to include new trunk lines and either the expansion of the sewer treatment plant or the construction of a new plant. . . . Multi-million dollar industrial research center for Miami, Fla. . . . Underway in Naples, Fla. is a plastics factory, an auxiliary plant for Brass-Martin Enterprise. . . . \$2,000,000 plant for processing pine stumps to be completed in September for Newport Industries in Telogia, Fla.

280,000 sq ft supply depot underway on an 82 acre tract in Atlanta, Ga. for Chevrolet Motor Div. of GMC. . . . \$13,000,000 electric generating plant planned by Georgia Power Co. in Brunswick, Ga. as part of Plant McManus . . . Georgia Vitrified Brick & Clay Co. planning \$400,000 expansion program in Campania, Ga. . . . Mica processing mill underway for Mica & Minerals Corp. of America in Hartwell, Ga. — to cost \$400,000 and to have a monthly capacity of 1000 tons.

Union Carbide & Carbon Corp. has purchased 140 acres of land in Clayton, N. C. to establish a research laboratory and experimental farm to test new agricultural chemicals . . . 62,000 sq ft will be added to the Lexington, N. C. plant of Pacific Mills Div. of Burlington Industries.

\$1,250,000 plant containing 60,000 sq ft underway for Bennettsville Manufacturing Co. in Bennettsville, S. C. . . . \$34,000,000 to be spent in the next two years on the construction of a jet air station in Beaufort, S. C.

Multi-million dollar distribution center underway for Western Electric Co. in Arlington, Va. . . . 40,000 sq ft will be added to Sam Moore Chair Co. in Christiansburg, Va. at a cost of \$200,000 . . . Thompson Products, Inc. constructing one of fourteen buildings planned for Martinsville, Va. to be used for development and testing of fuel systems and auxiliary power plant for rockets and guided missiles — to cost \$10,000,000 and to be completed in 1961.

\$5,000,000 sewerage plant and system for Clarksburg, W. Va. . . . Vanadium Corp. of America constructing a ferro-alloys plant in New Alexandria, W. Va. . . . \$4,000,000 distillation plant to be erected by Monsanto

Chemical Co. and Emery Industries in Nitro, W. Va.

East South Central

\$1,200,000 building being erected in Mobile, Ala. for Alabama Power Co. . . . In the spring Selma, Ala. will welcome the beginning of the \$7,000,000 magnesium plant for Alabama Metallurgical Corp.

260 persons will be employed at the \$750,000 plant of Dazey Corp. of St. Louis when June operations begin in Greenville, Miss. . . . \$4,000,000 factory underway for Kroehler Mig Co. in Meridian, Miss.

Nashville and Davidson Counties of Tennessee planning \$37,500,000 sewer program.

West South Central

Early fall completion is anticipated for Turney Wood Products, Inc.'s \$250,000 plant in Harrison, Ark.

\$20,000,000 chlorine and caustic soda plant slated for Wyandotte Chemicals Corp. on a 1200 acre site in Baton Rouge, La. — to be operated by Michigan Alkali Div. when production is begun late in the year . . . Multi-million dollar plant to be constructed by Petroleum Chemicals, Inc. in Lake Charles, La. — when completed in January, 1958 will produce 200,000,000 lb of ethylene annually . . . Underway for R. Guercio & Son, Inc. is a \$500,000 fruit processing and cold storage plant in New Orleans, La. . . . Dow Chemical Corp. erecting \$50,000,000 chemical plant in Plaquemine, La. . . . \$8,000,000 sewerage expansion and improvement program for Shreveport, La.

Ada, Okla. will be the home of the \$15,000,000 cement plant for Ideal Cement Co. . . . \$10,000,000 pipe factory being constructed for Johns-Manville Corp. in Denison, Okla. . . . March 31 is the scheduled completion date for the plant and general offices of Webster Engineering Co. in Tulsa, Okla.

Alpha Duck Wire & Cable Co. constructing a \$1,000,000 copper and aluminum wire and cable plant in Bonham, Tex. . . . Lucky Lager Brewing Co. to construct a \$15,000,000 brewery in Houston, Tex. . . . Underway is the \$7,000,000 J. L. Bates Power Station for Central Power & Light Co. in Mission, Tex. . . . \$200,000 meat processing plant to be erected in Robstown, Tex. . . . Roeglein Provision Co. to construct in San Antonio, Tex. a meat storage warehouse with a capacity of 5,000,000 lb.

Kansas & Missouri

Final phase of the \$1,300,000 water system improvement project being planned by Manhattan, Kan. . . . June completion is anticipated in Newton, Kan. for Marvel Industries' 250 x 120 ft plant which will manufacture window units for mobile homes.

Contracts amounting to \$1,874,938 have been awarded for construction work on the 44,000 kw power station in the Little Blue River Valley near Independence, Mo. — to be completed in 1958 . . . Beitz Packing Co. constructing a 25,000 sq ft beef slaughtering plant in St. Josephs, Mo. which is to be completed in October. . . . \$150,000,000 expansion planned by Granite City Steel Co. in St. Louis, Mo. which will increase ingot production 50% or to 2,400,000 tons annually.

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Simply fill in the coupon below and we'll send you, absolutely free and without any obligation, your choice of either our King-Size 10-ft. (\$2.39 retail) or Pocket 12-ft. White-Tape (\$1.89 retail)! (Offer limited to one tape per purchasing agent.)

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10-ft. $\frac{3}{4}$ " Wide Steel Tape
Stands Up Straight For
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The 33% wider blade (full $\frac{3}{4}$ ") stays straight up—will not bend when making measurements. Chrome plated zinc die-cast case. Free belt clip for handy carrying and Free Tenite Utility Case. Self-adjusting sliding hook for accurate inside-outside measuring. Also available in 6, 8, 12-ft. lengths.

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Work in feet and inches? Read Here
Work in inches? Read Here



EVANS 12-ft. Pocket WHITE-TAPE
Measures a full 12 feet—eliminates adding two measurements as with shorter tapes. Regular $\frac{1}{2}$ " wide blade. Chrome plated zinc die-cast case. Self-adjusting sliding hook for 100% accurate inside or outside measurements. Free transparent Tenite Utility Case. Also available in 6, 8, and 10-ft. lengths.

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For quick, efficient service call your Industrial Distributor.
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Keep boilers on the line with

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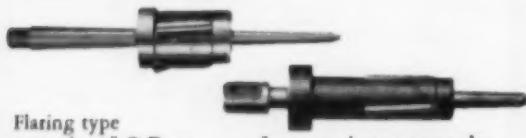
Designed to deliver maximum power at the most efficient cutter head speeds while negotiating sharp bends, the Model ECT Air Cleaners are excellent for cleaning curved boiler tubes from $2\frac{1}{2}$ " to $4\frac{1}{2}$ " O.D.

Self-feeding tube expanders



Wilson Model 38 tube expanders are self-feeding and parallel expanding. They are of the single flare roll type. Available for tubes 1" O.D. to $4\frac{1}{2}$ " O.D. with various roll lengths for tube seats $\frac{3}{4}$ " and up.

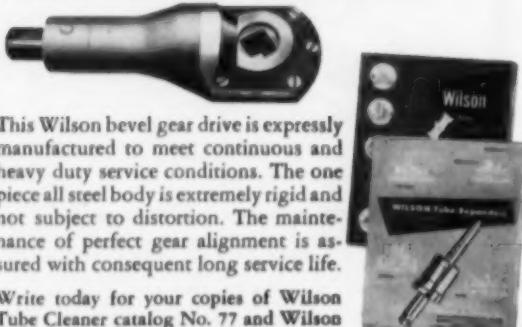
Model E Expanders



Flaring type
expander 1" O.D. to
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to 2" tube seats

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This Wilson bevel gear drive is expressly manufactured to meet continuous and heavy duty service conditions. The one piece all steel body is extremely rigid and not subject to distortion. The maintenance of perfect gear alignment is assured with consequent long service life.

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Mar. 3-5: Southern Safety Conference & Exposition, John Marshall Hotel, Richmond, Va. — Exhibits and technical sessions. W. L. Groth, Exec. Director, Box 8927, Richmond 25, Va.

Mar. 20-22: 20th Annual Short Course for Superintendents & Operators of Water & Sewerage Plants, Louisiana State University Campus, Frank T. Carroll, Jr., College of Engineering, L.S.U., Baton Rouge 3, La.

Mar. 25-27: Silver Anniversary, American Society of Tool Engineers, Shamrock Hilton Hotel, Houston, Texas. Ceramic & plastic tooling symposia, papers and panels. L. S. Fletcher, 10700 Puritan Ave., Detroit 38, Mich.

Mar. 25-29: 10th Western Metal Congress, Ambassador Hotel, Los Angeles, Calif. American Society for Metals, 7301 Euclid Ave., Cleveland, Ohio.

Mar. 27 - 29: 19th Annual Meeting, American Power Conference, Sherman Hotel, Chicago, Ill.

Mar. 28-29: 11th Annual Industry-Faculty Conference, L.S.U. Campus, Frank T. Carroll, L.S.U., Baton Rouge 3, La.

Mar. 28-29: Oklahoma Utilities Association, Annual Convention, Tulsa Hotel, Tulsa, Oklahoma.

Apr. 1-3: 24th Annual Conference, Southeastern Electric Exchange, Boca Raton Hotel & Club, Boca Raton, Fla. John W. Talley, Exec. Director, 711 Haas-Howell Bldg., Atlanta, Ga.

Apr. 8-10: ASME Spring Meeting, Hotel Dinkler-Tutwiler, Birmingham, Ala. The American Society of Mechanical Engineers, 29 West Thirty-Ninth St., New York 18, N. Y.

Apr. 9-11: Fifth Welding Show, American Welding Society, Convention Hall, Philadelphia, Pa.

Apr. 10-12: National Nuclear Instrumentation Conference and Exhibit, Atlanta Biltmore Hotel, Atlanta, Ga. Technical sessions on instrumentation of nuclear power plants, radiation measurement, etc. Over 100 exhibits. Host Atlanta section Conference Committee headed by M. A. Dailey, Chairman and J. M. Spurlock, Vice-Chairman. Herbert Kindler, I.S.A., 313 Sixth Ave., Pittsburgh, Pa.

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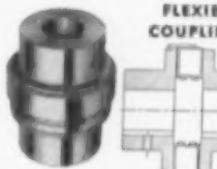
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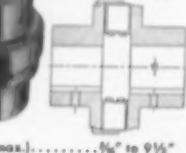
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Bore (max.) $\frac{1}{2}$ " to $9\frac{1}{2}$ "
O.D. $\frac{3}{4}$ " to $21\frac{1}{2}$ "
Wt. $\frac{1}{2}$ oz. to 1500 lb.
H.P. 1/20 to 3000
Torque (static) $1\frac{1}{2}$ to 5100 ft.-lb.



Variable Speed Pulleys

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Bore (max.) $\frac{1}{2}$ " to $1\frac{1}{2}$ "
O.D. 3" to $13\frac{1}{2}$ "
Belt Sizes A to C TW
Speed Ratios 1:1 to 8:1
H.P. (1750 rpm.) $\frac{1}{2}$ to 15



Select-O-Speed Transmissions

B
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Belt Sizes A to C
Speed Ratios 1:1 to 10:1
H.P. (1750 rpm.) $\frac{1}{2}$ to $7\frac{1}{2}$



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Bore $\frac{1}{4}$ " to 2"
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JENKINS Fig. 106-A

The FIRST
Renewable Composition Disc
BRONZE GLOBE VALVE
150 lbs. Steam 300 lbs. O.W.G.
1/8 in. to 3 in.

Making a Work Horse a Champion

Take a Fig. 106-A apart. It's easy to see the reason why it's the "champion" of disc-equipped Bronze Globes. Every part, from heatproof handwheel to pipe ends, reflects the design and construction skill of generations of Jenkins Valve specialists.

Jenkins Bros. introduced the first renewable composition disc Globe... is still the only manufacturer of both valves and discs.

Fig. 106-A not only looks better—it proves out better in performance. In any comparison, its long-life, low-up-keep record has always set the standard. That is the true measure of valve cost—and it is the reason why industry's shrewdest buyers will settle for nothing less than Fig. 106-A quality.

The Fig. 106-A "family", with interchangeable parts, provides Globe, Angle, and Check patterns to meet 90% of average valve needs.

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VALVES



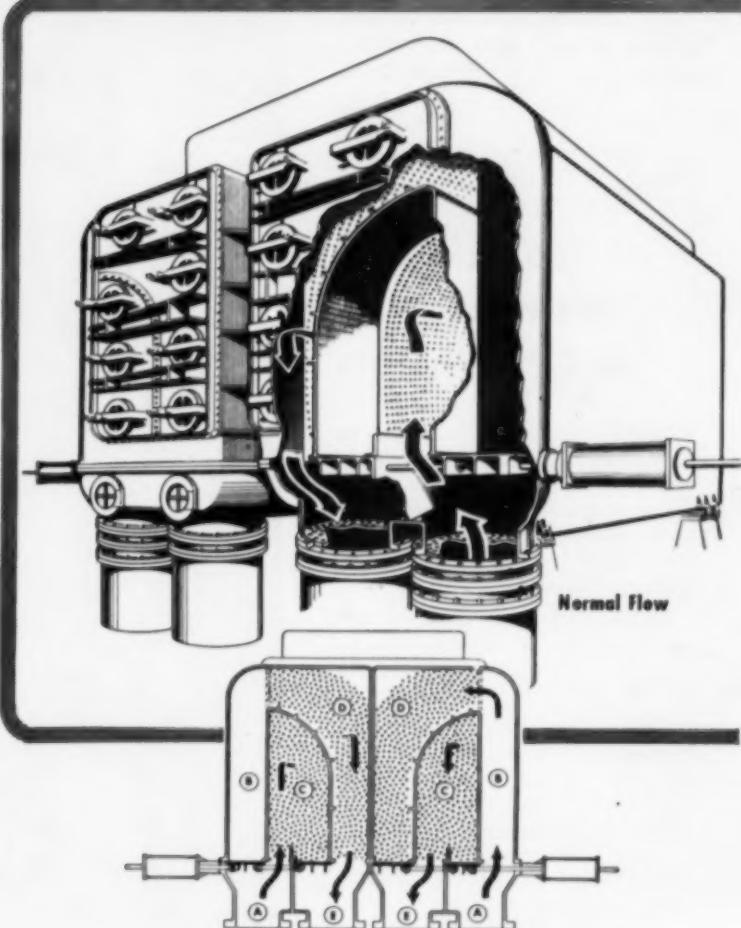
REVERSE FLOW by C. H. WHEELER

Cleans Steam Condenser Tube Sheets Without Loss of Load

When debris and organic growth collect on the tube sheets of a C. H. Wheeler Patented Reverse Flow Steam Condenser, you don't have to shut it down for cleaning. It cleans itself—without loss of load. Sluice gates arranged within the condenser may be controlled, either electrically or hydraulically, to reverse the flow of cooling water through the tubes. This sudden reverse flow literally flushes away leaves and debris, dislodges crustaceous matter from clogged tubes.

Because of 100% water flow during back flushing, there is only a negligible dip in vacuum momentarily, thus permitting continuous load on the turbine. The Reverse Flow Condenser cleans itself in minutes, compared with hours of downtime when tube sheets are manually cleaned. A typical report shows a half-inch loss of vacuum (due to fouled tubes and tube sheets) was restored in five minutes after reversing the flow of cooling water. Often, a C. H. Wheeler Reverse Flow Condenser goes two years or more without shut down for cleaning, depending on the condition of the cooling water.

New, exclusive deaerating features and construction techniques help make C. H. Wheeler Steam Condensers "First in Efficiency." Let C. H. Wheeler Custom Engineer your next steam condenser. Phone or write C. H. Wheeler Manufacturing Co., 19th & Lehigh, Philadelphia 32, Pa. . . . Manufacturers of Steam Power Plant Condensers • Vacuum Equipment • Marine Auxiliary Machinery • Water Supply, Drainage and Circulating Pumps.



Left Side Shows Normal Operation

Water enters inlet A with right port open. Flows through tube bank C to rear of condenser . . . returns through tube bank D to front of condenser and discharges at E.

Right Side Shows Reverse Flow

Sluice gates move on a common stem. Water flows up through channel B, and through tube bank D to rear of condenser . . . returns through tube bank C to front of condenser.

In the C. H. Wheeler Divided Water Box Design, each half of the condenser can be back-flushed independently.

WE603

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